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116

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Machine Shop

MAY, 1943

Vol. 15, No. 12

CINCINNATI, OHIO

We Present ---

- as the feature article in this month's issue an interesting and timely review on the building of mine sweepers at the shipyards of the Tampa Shipbuilding Company, Tampa, Fla. In this article, the author L. H. Houck presents some of the problems that arise in a shipyard machine shop and tells how they are solved.
- —on page 132—the first installment of a series of two articles entitled "Wage Incentives for More Production," written by the George May Business Foundation—a non-profit, non-political, unbiased organization devoted to research and reports on problems of business management. It is pointed out that by paying a worker for production instead of for elapsed time, the "wage incentive" actually becomes a production incentive.
- on page 150 the fourth of Noel Brindle's articles on the design and application of tools for the automatic screw machine. The discussion on turning methods and tools is continued in this article, with examples presented showing the use of hollow mills and swing tools.
- on page 168 a story on the salvaging of scrap at the Schenectady Works of the General Electric Company. The salvaging processes and methods described herein should prove of unusual interest to a great many plants.
- on page 180 a presentation of the design of a compound progressive die of unusual design.
- on page 190 illustrations and descriptions of several original designs and gadgets for saving time and speeding up production, under the heading "Ideas from Readers."
 - the usual New Shop Equipment section, the monthly cartoon, and so on.



The Launching of the Mine Sweeper "Nautilus" at the Tampa Shipbuilding Company Yards, December 8, 1942

Building Mine Sweepers at Tampa Shipyards

By L. H. HOUCK

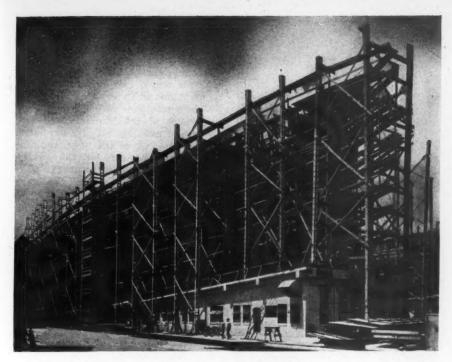
In this article the author presents some of the problems that arise in a shipyard machine shop, and tells how they are solved.

NEW records for speed and quality are being set by 11,000 workers at the yards of the Tampa Shipbuilding Company, Tampa, Florida, where on the first anniversary of Pearl Harbor seven new vessels were launched to become a part of Uncle Sam's Navy. The seven included six mine sweepers and a destroyer tender. The tender was the largest ship of its type ever launched in the Gulf of Mexico. Seven more ships have been launched since December 7, 1942.

The welded type of ship construction is the rule at these yards, due to the well-known advantages of welding over the former methods of construction. In a riveted ship, for instance, the steel plates are overlapped and riveted, which means a double thickness of plate on all four sides of a sheet. The extra metal required for the over-lap not only is wasted, but the extra weight of the over-lapped metal, plus the weight of the rivets, reduces the available cargo tonnage by about 14 per cent.

A welded hull is practically all one piece when finished, without overlapping and without rivets. Thus a saving is made on materials and on weight, and the comparatively smooth surface of the hull permits an increase in speed over the speed possi-

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Shipyards of the Tampa Shipbuilding Company, Tampa, Florida

ble with a hull that is studded with rivets.

Both electric and acetylene welding are used in building welded ships. Plates are welded with the electric arc, for which DC motor-generator sets are used exclusively. Most of the cutting of plates and other patterns in steel plate is done with acetylene cutting torches used in connection with semi-automatic machines.

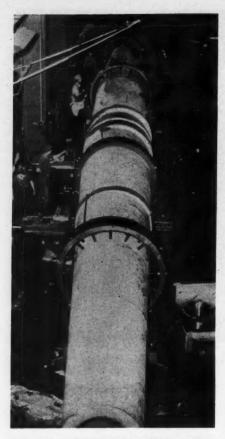
The machine shop at the Tampa Yards is housed in a new steel and concrete building built especially for this work. Besides the main floor, which is 100 x 260 feet, there is a mezzanine floor on each side containing 15,600 square feet. Much of the smaller equipment, such as the small lathes, saws, drill presses, engraving machine, tool grinders, small millers,

and hardening furnaces are located on the mezzanine.

Work can be handled to any point on the main floor by either of two Niles traveling cranes—a 25-ton and a 15-ton.

Besides being equipped to handle the designing and manufacture of parts for all kinds of ships, the Tampa company can make needed repairs on any kind of ship that floats—regardless whether equipped with ancient reciprocating engines, the latest Diesels, or modern turbines. This company also operates and repairs dry docks, and manufactures all kinds of pumping equipment.

Work that comes to the shipyard machine shop is, however, characterized by one feature—most of it is too big for the machines, no matter how



Machining a "King Pole" in a 66-Inch Putnam Lathe Equipped with Special Steadyrests. The End of the Workpiece is Faced by Bolting a Tool Post to the Floor

big the machines are. The result is that there is almost no end to improvising and adapting in order to turn out the work. The largest lathe in the shop is a 66-inch Putnam with a 55-foot bed. By using blocks under the headstock, the swing can be increased to 96 inches.

On the day that this writer inspected the shops for MODERN MACHINE SHOP, the job in the big lathe was a fabricated steel post, called a "king

pole," which is used to support a revolving turret on a steel ship. The post was about six feet in diameter and about 100 feet long. When in use in a ship, the post revolves on bearings for which two surfaces have to be machined to an angle of 70 degrees within a tolerance of 0.002 inch.

Because of the size of the work, the use of ordinary steadyrests and a tailstock is out of the question. The tailstock is useless for the reason that the work extends several feet beyond the bed of the lathe. Ordinary steadyrests are much too small to be of any use.

In order to center the piece in the lathe and support it properly for machining, it became necessary to design steadyrests of an entirely new type. The first step was to have the foundry cast three rings, large enough to encircle the work with a small amount of clearance. Each ring was wide enough to accommodate two rows of holes for bolts all the way around, with a bearing space between the rows of bolts.

The rings were drilled and tapped for the two rows of bolts, the holes being located at intervals of three to four inches, then the bolts were threaded in and fitted with lock nuts. By adjusting the bolts, the work could be centered in the rings, and when the bolts were tightened, the rings revolved with the work. To provide a bearing and support for each ring, a carriage was made to fit the ways of the lathe and equipped with ball bearings upon which the ring rides as it revolves with the work. These rests work perfectly.

The end of the workpiece projected past the foot end of the lathe; still it required facing. To perform this operation, a toolpost was made that could be bolted to the floor in such position that a facing tool could be fed across the end of the work, thus making it possible to finish the piece

View of the Steadyrest, Showing the Center Bearing Which Serves as a Ball Race

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before removing it from the lathe.

The machining of the circular track on the gun turret and the fitting of the track to the turret is an interesting process. The machine with which the turret track is machined is picked up by the electric crane and set on the top of the turret, the turret being bolted to the floor. The machine is so designed that it revolves by its own power, facing the top of the track as it revolves.

When the track machining operation is completed, a 25-ton crane



picks the machine up and moves it away. The turret is then set on blocks, a dummy post is set up in the center to take the place of the actual king post, and the turret bearings are finished. The turret track is 35 feet in diameter and the turret has both stationary and revolving platforms, the latter being revolved through a bull gear.

Centering Workpiece in Special Steadyrest Consisting of Steel Ring that Revolves on Ball Bearings. The Workpiece Extends Past the End of the 54-Foot Lathe. Note the Straight Edge Attached Vertically to the Front of the Steadyrest Support from Which Measurements can be Taken to Center the Work



To Machine the Track on a Gun Turret, the Machine Tool is set on the Turret as Shown Here. The Machine Feeds Itself Around the Workpiece, Cutting as It Goes

Another job that is peculiar to the shipyard is the machining of a ship's rudder. It is a bit hard for a land-lubber to realize the size of a rudder for a ship the size of a mine sweeper. The sweep part of the rudder is hollow, the entire piece being made of steel. The steel used in the sweep of the rudder is % inch thick, and the rudder is fabricated by electric welding. When completed, the rudder is welded to a huge steel bar which is bored for the rudder shaft.

Some idea of the size of the rudder can be obtained from the fact that the rudder shaft on one of the rudders finished at this yard was 21 feet long, 20 inches through its largest diameter, and weighed about five tons. This shaft has a three-foot taper on the end which fits into the rudder, the taper being one inch per foot. The diameter of the shaft at the large end of the taper is 17 inches.

There are several lathes in these

shops large enough to machine this shaft. After the taper has been turned, two keyways are cut in the tapered portion so that it can be keyed to the rudder. The keyways, which are 2½ inches wide by 1½ inches deep by 3 feet long, are cut in

an openside Cincinnati Hypro planer. Corresponding keyways must be machined in the tapered hole in the rudder.

The hole in the rudder to receive this shaft is bored in an 8-foot Beaman & Smith horizontal boring mill which, incidentally, is the largest machine of its kind in the state. Boring the taper was not so difficult, but cutting the two keyways in the tapered hole presented a real problem.

To cut the keyways a special fixture was rigged up, a Thor rotary vane air motor being used for power. The motor was built for a speed of 4,200 r.p.m., so it was necessary to build a reduction gear to reduce the speed to a point where it would be suitable for driving a 2½-inch hollow end mill.

The air motor used is about 3½ inches in diameter and 4½ inches long. The end mill was specially made for this job and had a short shank so



This photograph illustrates clearly the working parts of the Perfex Dresser.

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D Radius Adjustment

Stop Pins

Tangent Slide

Dressing Diamond Dressing Tool Mounting

Delivery Reasonable delivery on all Perfex Dressers with necessary priorities.

The exclusive feature of Perfex's diamond mount construction and the way in which the shank of the diamond tool is ground, automatically locates the diamond on perfect center every time. To illustrate see cut at left showing 90° vee in dresser's diamond mount block, and also flats ground on diamond tool shank. There is no guesswork or wasted time in set-ups with a Perfex Dresser. For detailed information write for literature today.

The Perfex Dresser dresses in horizontal position exactly in the plane in which the work will be ground. This allows wheel dressings to be thrown away from the dresser into the dust collector.

2 The radius can be set accurately to within .0001.

All moving parts made from hardest steel ground and lapped to a perfect fit.

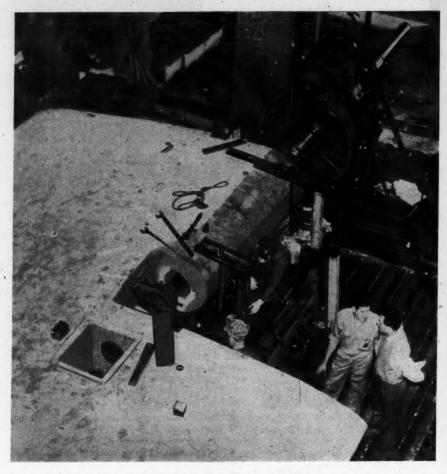
4 It is possible to return the diamond to center after dressing an angle within .00005.

5 It is possible to dress a .050 radius to a full half circle without additional attachments.

6 Vernier is very legible, can be easily read from normal position.

7 All surfaces protected from rust.

PERFEX DRESSER CORPORATION DETROIT, MICHIGAN 3607 GAYLORD



Boring the Shaft Holes in the Rudder. The Shaft that Fits this Hole is 21 Feet Long, 20 Inches
Through its Largest Diameter, and Weighs Five Tons

that the whole outfit could be set up for operation inside of a 17-inch hole. It was not possible to use a conventional chuck to Morse taper shank to hold the end mill in the gear reduction spindle, so the stub end mill was bolted into the driving spindle inasmuch as the mill shank was hollow somewhat in the manner that a collet is held.

The outfit was supported by frame

work extending from top to bottom of the hole, and the cuts were taken at right angles to the supporting members. The guide for the motor and cutter was built at an angle which made it possible for the cutter to travel the full length of the cut at the same depth setting.

The keyways were machined in two cuts each, the bulk of the metal being removing in a roughing cut with a



Rudder Bored for Tapered End of Rudder Shaft. Each of the Two Keyways in the Taper is 3 Feet Long by 2½ Inches Wide by 1¼ Inches Deep. The Keyways were Cut with an End Mill in a Special Fixture Driven by an Air Motor

finishing cut to finish the keyways to size.

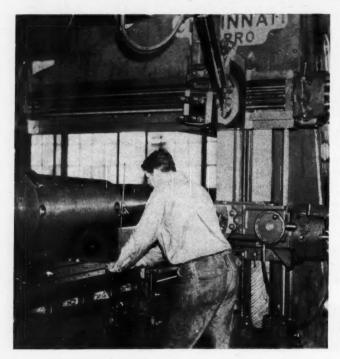
The Tampa Shipbuilding Company makes large centrifugal pumps which are shipped all over the world, four 54-inch pumps being shipped recently to U. S. Naval needs. The shells for these pumps are cast in the "Tasco" foundry

and machined in the shops, and it is common practice to block the head-

stocks on the lathes up to heights that will make it possible to face the pump

shell flanges.

The shop is very well equipped for the class of work handled there. There are 12 lathes on the main floor, ranging in size from an 18 - inch Le-Blond to a 66-inch by 54-foot Putnam. Much of the smaller equipment is located on the mezzanine, including 9-inch, 11-inch, and 16inch lathes and small drill presses



Setting the Rudder Shaft Up on a Cincinnati Hypro Openside Planer to Cut the Keyways





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Today, as ever, Cincinnati Shapers are indispensable in both the large plant and the small shop. Such Cincinnati features as: built in power rapid traverse to the table, multiple cam feeds, direct reading indicators, bring to the user of a single machine or of many machines an outstanding usefulness.

Write for informative book N-2 on the complete line of Cincinnati Shapers.

THE CINCINNATI SHAPER CO.

CINCINNATI DHIO U.S.A. SHAPERS - SHEARS - BRAKES



Belt Drives have been Replaced with Modern Individual Motor Drives, Making it Possible to Move Machines Around the Shop as Needed

with a number of others working in the welding and construction departments. So, while a great many trades and industries are represented in a finished ship, the machine shop plays one of the most important parts in shipbuilding.

Waste

One oxygen leak as small as 1/64 inch in a hose operating at 100 pounds pressure wastes 290 cubic feet of oxygen in 24 hours. The Waste Warden who calls attention to this fact also recommends frequent hose inspections to detect leaks, which occur most often near connections to the regulator or the torch, and advises operators not to use excessive pressure or over-size tips nor to leave a torch burning when it is not in use.

and milling machines. All the tool grinding is done here, also with sev-

eral different types of tool grinders. A Continental 26 - inch DoAll is used to cut dies and patterns to shape, also for filing.

Like other war industries, women have invaded the ranks of the ship-yard workers. There are 33 women employed in the machine shop alone,



Headstock End of 66-Inch by 55-Foot Putnam Lathe. This Headstock is Often Blocked up to Swing 8-Foot Work

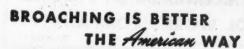
LINES BEHIND THE LINES

FROM THE RAILROAD INDUSTRY'S PRODUCTION LINES COMES A VARIETY OF "ROLLING STOCK" TO BACK UP THE FIRING LINES

Intensifying production of vitally needed transportation equipment is just one of the railroad industry's war assignments. To it has been intrusted the added task of producing many other types of war materiel. Where seconds count and precision is at a premium, the railroad industry relies on broaching—a better way to do many metal working jobs, the only right way to do some!



Three internal teeth are cut and finished with each pass of the tool. At completion of the stroke the broach is hydraulically withdrawn from the cut, and the gear is indexed to next working position during the upward stroke. When the 348 teeth are finished the machine automatically stops, permitting easy and rapid reloading of a new blank.





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The new "American" Pacemaker Lathe is recognized throughout the metal working industry for this very characteristic, resulting in its extensive use wherever precision on a production basis is required.

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WILSON MECHANICAL INSTRUMENT CO. INC.

Wage Incentives for More Production, I

The authors show that by paying a worker for production, instead of for elapsed time, the "wage incentive" actually becomes a production incentive.

> By the GEORGE S. MAY BUSINESS FOUNDATION Chicago, Illinois

MERICAN industry has made wonderful progress toward allout war production. But nobody really knows how much more production may be required to bring about the unconditional surrender of our enemies. Industry must fill the need, however great, and cannot relax its efforts until the last battle is won.

From yesterday's experience and today's practice, surer and better methods must be adopted to meet tomorrow's needs. Herein rests a challenge to American ingenuity.

Industrial management can make a further contribution by re-examining all of the components of existing planning and production programs. Last year's system may be inadequate for future demands.

Since theoretical machine capacities are known, industrial engineers believe we must depend largely upon the human element for further production increases. Better coordination of management, labor and machines may work miracles. The men on the production line are just as patriotic as the men on the firing line. With fair encouragement, they will cooperate to obtain more production. Management

alone can lead the way, and management must take the initiative.

Increasing Use of Wage Incentives

It is known that wage incentives frequently increase the productivity of workers from 100 to 300 per cent, and that such incentives are widely used in many industries. After an exhaustive study of the subject, the National Metal Trades Association, some years ago, urged its members to use incentive plans wherever and whenever possible. Recent surveys suggest probably one-half of American manufacturers have adopted wage incentive plans, at least in some departments. Labor unions usually favor such programs when they are fair to the individual worker.

The efficacy of soundly-conceived, properly-installed wage incentives no longer is questioned, although some executives might not be fully abreast of recent developments. Experience demonstrates that all classes of employees may be covered under simple, workable plans, either individually or in homogeneous groups.

History of Incentives

The basic idea probably is as old as

The George S. May Business Foundation, which prepared this article, is a non-profit, non-political, unbiased organization devoted to research and reports on problems of business management. The Foundation is managed by a board of trustees headed by Mr. May, a nationally known business engineer. Of the Foundation's activities Mr. May says, "There's a real need for a scientific fact-finding study of the increasing problems which confront business management in its effort to maintain war production and earn profits. In the solution of these problems lies the ultimate answer to our national social problems, for our democratic institutions and our social welfare as a whole depend upon the success of business enterprise."

The Foundation's study subjects are selected by the board of trustees in collaboration with editors of leading business publications. A chosen subject is assigned to one or more staff research men qualified by special experience in the field being studied. Their job is to get the facts and to draw conclusions based on the facts without restrictions as to what those conclusions may be.



GEORGE S. MAY

Following publication in periodicals, Foundation reports are printed and made available free of charge to business men requesting them on their business letterheads. They are also circulated without charge to the Foundation's own private mailing list of 110,000 business men. During the last two critical years, 4.510,000 research reports solving business and production problems have been mailed by the George S. May Business Foundation.

mankind. Centuries before the dawn of the Christian era, it was understood and utilized by the ancient Chinese and Persians. Europeans experimented with it before the industrialization of America.

Frederick Winslow Taylor, known as the founder of Scientific Management, gave new meaning to the idea, nearly fifty years ago, when he showed American industry how to increase production and reduce total unit costs while paying higher wages to labor.

He proceeded upon the rational assumption that "man will not do an extraordinary day's work for an ordinary day's pay." Mr. Taylor maintained that employers can well afford to pay higher wages "provided each man and machine in the establishment turns out a proportionately larger amount of work." He might have added the further provision that employers can afford to pay higher

wages only if the increased production can be disposed of without a sacrifice in selling price or undue additional cost of distribution.

Taylor noticed that certain indirect expenses remain approximately constant whether the output of the establishment is large or small. From this it followed that "the diminution in the indirect portion of the cost per piece will be greater than the increase in wages."

"Many manufacturers, in considering the cost of production, fail to realize the effect that the volume has on cost. They lose sight of the fact that taxes, insurance, depreciation, rent, interest, salaries, office expenses, miscellaneous labor, sales expenses, and frequently the cost of power . . remain the same whether the output of the establishment is great or small," Mr. Taylor said.

Time has confirmed the inherent

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soundness of the principle thus enunciated.

How Volume Affects Profits

Until recent years, many engineers and cost accountants considered only the direct labor savings resulting from increased production. The employer often retained a portion of such savings. This kind of thinking is rapidly becoming obsolete. As Taylor pointed out, nearly fifty years ago, direct labor costs are not as important as total unit costs. When the additional profit on each extra unit of production is properly evaluated, it usually exceeds the direct savings in With increased production, labor. larger profits may be earned-despite higher wages. The following simplified examples may illustrate the principle:

Example A assumes production of 10,000 units, without an incentive plan. The costs appear below—

	Single Unit	10,000 Units
Direct Material	.\$ 5.00	\$ 50,000
Direct Labor		
(5 hrs. @ 60c)	. 3.00	30,000
Variable Burden		
(5 hrs. @ 50c)	. 2.50	25,000
Total Cost	. 10.50	105,000
Selling Price	. 16.00	160,000
Gross Margin	5.50	55,000
Less Fixed Burden		40,000

labor and machine capacity to turn out 14,000 units simply by employing more men and using idle machine hours. It is also assumed that the additional volume of production can be sold or absorbed. No wage incentive plan is used. The costs would be as follows—

	Single Unit	14,000 Units
Direct Material	.\$ 5.00	\$ 70,000
Direct Labor (5 hrs. @ 60c) Variable Burden	. 3.00	42,000
(5 hrs. @ 50c)	. 2.50	35,000
Total Cost	. 10.50	147,000
Selling Price	. 16.00	224,000
Gross Margin Less Fixed Burden		77,000 40,000
Net Profit	.\$ 2.64	\$ 37,000

Comparison with Example A reveals net profit under Example B has increased from \$15,000 to \$37,000, although material and labor costs remain unchanged. By spreading the Fixed Burden over 14,000 units instead of 10,000, the unit charge for Fixed Burden is lowered from \$4.00 to \$2.86, which accounts for the greater net profit.

It is scarcely necessary to add that the foregoing example suggests a wasteful use of manpower and machines during wartime.

Example C also assumes production of 14,000 units with an incentive plan in operation.



Net Profit \$ 1.50

Example B assumes availability of

\$ 15,000

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"PHOTO FINISH" with a Big Difference Carrie Finish—Fast Stock Removal Photomicrograph (enlarged ten times) of metal surface* filed with this 12-inch Nicholson Flat Bastard File. Under 2000 strokes at proper hand-filing pressure, this file yielded 48.5 grams of coarse filings. Smoother Finish—Last Stock Removal Photomicrograph (enlarged ten times) of metal surface* filed with this 12-inch Nicholson Flat Second Cut File. Under 2000 strokes at proper hand-filing pressure, this file yielded 33.11 grams of medium-fine filings.

*Both tests were made on 1-inch square bars of LaTrobe Annealed Carbon Tool Steel (carbon content 0.95%-1.05%; Rockwell hardness B 69-B 72). File photographs (unretouched) made after files were used in this test.

THE comparative tests described above show clearly that The right file for the job is highly important toward making filing skill yield its utmost. Similar tests with other types and cuts of files will reveal equally interesting comparisons.

What's the job and what's the metal; what's the finish and what's the time the job warrants? Do they call for rapid stock removal, and much or little; for rough, medium or precision

results? These are some of the questions which, in these days of specialized production, must be answered with the right file.

FREE REPRINTS of a large-size ad describing and illustrating more completely the laboratory test mentioned above. Excellent instructive material for new workers. Send for it. Also—

FREE BOOK, "File Filosophy" (48 pages). Includes comparative differences in design and results of numerous other files.

Nicholson File Co., 48 Acorn St., Providence, R. I., U. S A. (Also Canadian Plant, Port Hope, Ont.)

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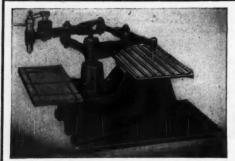
Although the direct labor cost remains the same, the processing time is reduced from 5 to 4 hours per unit, due to the influence of the incentive. Freeing the plant for other production reduces Variable Burden from \$2.50 to \$2.00 per unit. Net profit consequently rises from \$2.64 to \$3.14 per unit, or \$7,000 in the aggregate, as shown below:

	Single Unit	14,000 Units
Direct Material	.\$ 5.00	\$ 70,000
Direct Labor		
(5 hrs. @ 60c)		42,000
(4 hrs. actually worke Variable Burden	d)	
(4 hrs. @ 50c)	. 2.00	28,000
Total Cost	. 10.00	140,000
Selling Price	. 16.00	224,000
Gross Margin	6.00	84,000
Less Fixed Burden	. 2.86	40,000
Net Profit	.\$ 3.14	\$ 44,000
Example D likewis	e assun	nes pro-

duction of 14,000 units, with an incentive plan in operation. Better performance standards, based upon improved methods, permit a reduction in direct labor cost from \$3.00 to \$2.70 per unit, resulting in total net profit of \$48,200 as shown below:

	Single Unit	14,000 Units
Direct Material Direct Labor	.\$ 5.00	\$ 70,000
(4½ hrs. @ 60c) (4 hrs. actually works		37,800
Variable Burden (4 hrs. @ 50c)	. 2.00	28,000
Total Cost	9.70	135,800
Selling Price	. 16.00	224,000
Gross Margin		88,200
Less Fixed Burden	. 2.86	40,000
Net Profit	.\$ 3.44	\$ 48,200

Compared with Example A, the total net profit under Example D is \$33,200 greater after paying wage increases amounting to \$7,800.



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Automatic centering of the driver in the Phillips Recess makes such efficient use of turning power that screws set-up uniformly tight... with so little effort that workers maintain speed without tiring. Screw and driver "become one unit," making driving so easy and fool-proof that work is greatly speeded up, regardless of the driving method employed. In most cases, power driving becomes practical.

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The Phillips Recessed Head ras scientifically engineered to

Fast Starting—Driver point and matically centers in the second. In songly. Screw and driver "become une unit." Fumbling, wabbly stern are eliminated.

Faster Driving—Spiral and power driving are made practical. Drive won't allp out of recess to injur-weekers or spoil material. (Average concepting in 50%.)

Seasor Driving—Tuening power is fully utilised by automatic centering of driver in screw head. Worker maintain speed without tiring.

setter Festenings—Screws are et-up staiformly tight, without burnng or breaking heads. A strenger, seater ich results.



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Asserban Sareer On, Prividence, R. 5. The Outral Box, Waterchery, Sona. Outral Sareer So., Ethongs, M. Chandler Products Sorpe, Stevenson, Otto Societastal Sareer On, How Bofferd, Moss The Gertin Sareer Carp., Nov. Pritain, Com The A. M. Harner Ge., Objungs, M. histornational Barium Ga., Botroth, Blinb.
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Phosi Haartestering So., Bilango, II. Leading Sorus So., Recristure, Fd. Leasel Burtsell & Word Solf & Sot So., Part Obspilit, S. Leavill Magnisturing So., Waterville, Cond.



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Proper Installation Necessary

Unfortunately, some of Taylor's contemporaries and many of those who followed overlooked the vital principle in their enthusiasm over his piece rate plan. A great crop of "efficiency experts," with numerous wage plans and systems, came into being, and sometimes repeated the errors committed during the earlier Euro-

pean experiments.

Nowadays, certain broad principles rather than precise formulae govern the application of wage incentives. Base rates, when determined by external forces, need not be changed. Experience indicates incentives may be built into almost any practical wage payment plan by setting the correct performance standards. Before attempting to establish performance standards, the following preliminary steps should be taken, namely (1) Review of Production Controls, (2) Job Standardization, and (3) Job Evaluation.

Reviewing Production Controls

To insure steady operation at all work centers, a thorough study should be made of all phases of planning and production. Factors deserving close scrutiny include product design, materials, supervision, working conditions, methods, shop lay-out, machines, tools and jigs. The acquisition and handling of materials, routing, machine loading, scheduling, dispatching and inspection should receive attention.

Emerson said that efficiency means the right thing is done in the right manner, by the right man, at the right place, in the right time. His definition of efficiency also could be used as a statement of the aims of a good production control system.

In the light of experience since Emerson's day, the modern engineer might add—If the right man is on the right job at the right time with

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the right wage incentive, production schedules are more likely to be maintained.

Job Standardization

By this procedure, performance standards are set for each job. Wage incentives, in the form of increased compensation, accrue when a worker's production exceeds the standard thus established.

Jobs are carefully studied with the view of determining the "one best way" of accomplishing each task. Elementary operations are broken down and analyzed so as to ascertain the time and manner in which a task ought to be performed by a worker of average ability. Naturally, allowances are included for fatigue and other delays. Time and motion study enter this phase of the undertaking, and eliminate guess work. Standards based upon experience or loose estimates are being replaced by those supported by precise measurements.

Standard written instructions are prepared to cover each task. Such instructions contain details of each operation, and list all tools required to do the job.

The determination of correct labor standards calls for experience, skill and sound judgment. The degree of care exercised in this supremely important undertaking may mean the difference between success and failure. At best, there is always the likelihood that some later adjustments must be made, but the standards as a whole should be soundly conceived in the beginning. A discussion of several possible rates may bring out some of the factors which should be considered.

RATE A. Time studies show the plant is operating at an efficiency of 60 per cent of high task, which is not an unusual situation. If labor standards are set at this low (60 per cent) efficiency, a 60 per cent increase in





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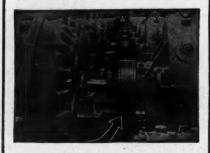
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production, bringing it up to 96 per cent of high task, probably is the maximum production obtainable without layout and method changes. Of course, this rate would be too "loose."

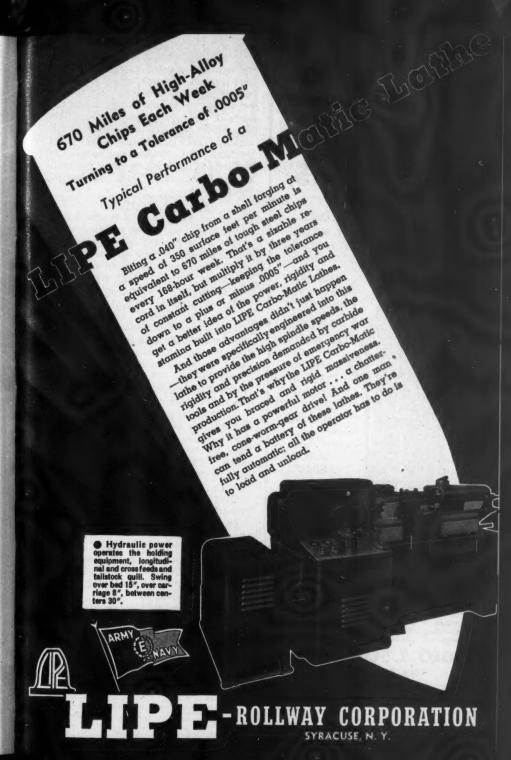
RATE B. By better supervision and planning, but without layout and method changes, the standard might be set at 80 per cent, or 1/3 above the present low (60 per cent) production. Under this standard, production probably would not exceed 120 per cent of high task.

RATE C. By making certain method and layout changes, production may be further increased. Assuming this step permits a rate of 100 per cent of high task, the top limit of production may be set at 150 per cent of high task. Under this rate, production should rise to 250 per cent of the present low (60 per cent) efficiency.

Summarizing the foregoing: Rate A, affording the worker a maximum bonus of 60 per cent, would result in the highest unit cost, yielding about 20 per cent less production than Rate B. Paying a maximum bonus of 50 per cent, Rate B would make possible production of 120 per cent of high task. Rate C, based upon layout and method changes, and permitting production of 150 per cent of high task, consequently appears to be the most effective.

In aiming for maximum production, a "middle of the road" course seems most likely to bring about the desired result. If rates are set too high, workers will be paid too much for too little production. If rates are set too low, the incentive cannot exert itself and therefore fails to perform its function.

During pre-war days, when factory output was limited by sales possibilities rather than production bottle-necks, incentives were calibrated to induce labor to turn out an increased amount of production per hour before earning a bonus. Today, when



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GEO. T. SCHMIDT, Inc. 1806 BELLE PLAINE AVE. CHICAGO, ILLINOIS the urgently needed extra production may depend so much upon labor's utmost efforts, cases arise where it may be wiser to adopt as standard the current rate of hourly production. Sometimes this concession may be advisable notwithstanding the fact workers are obviously capable of turning out much more work per hour and will assuredly earn substantial bonuses.

Job Evaluation

Jobs are analyzed and evaluated according to their relative importance within an organization. Job evaluation is entirely impersonal, and should not be confused with man rating or individual merit rating, which may and frequently does follow.

The great number and complexity of jobs in modern industry have caused both management and upor to favor a scientific approach to the determination of comparative base rates. A sound basis of wage adjustments lessens the probability of individual dissatisfaction and facilitates the negotiation of union contracts.

After determining job characteristics such as skill, effort, responsibility and working conditions, point values may be assigned to such characteristics. These points or ratings then may be translated into wage rates. Although basic wages are often controlled by external forces, it is always possible to set a scale ranging from high to low, with several intermediate classifications.

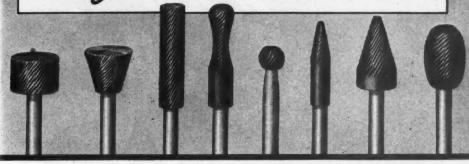
As a wide variety of plans and systems of job evaluation are in use, it is not practicable, in an article of this kind, to treat the subject as fully as might be desired.

Aside from its importance in a wage incentive application, job evaluation tends to simplify employment procedures by providing the personnel officers with a reliable yardstick for measuring applicants.

(The second section of this article will be published in the June issue.)

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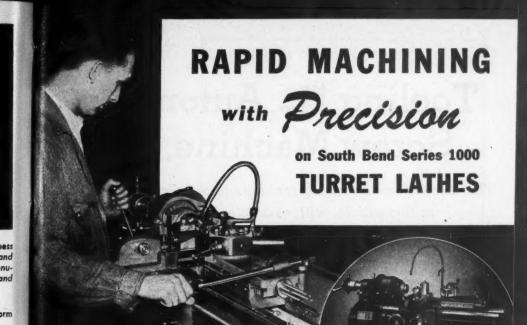
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Tooling for the Automatic Screw Machine, IV.

The discussion on turning methods and tools is continued in this article, with examples showing the use of hollow mills and swing tools.

By NOEL BRINDLE

IN A former article on the subject of standard turning tools for use in the B & S Automatic Screw Machines, three workpieces were illustrated. The turning tools used in the manufacture of these pieces consisted of balance turning tools, knee tools, style 1 box tools, roller back rest box tools, and box pointing tools. This article presents examples in which hollow mills and swing tools are employed.

The part shown in Fig. 19 could be made by several different methods; but in automatic screw machine work, the best method should be chosen. In this article the author will show how

the method is determined.

In studying the part drawing it will be noted that all the dimensions are given in fractional inches. Furthermore, "Note A" specifies, that no cut-off tool marks are permissible. It will be necessary to consider this instruction more fully when the order of operations is being decided.

For the style and size of machine to be used, a B & S No. OG H.S. Automatic will be selected. The newer types of OG high speed machines have a choice of 36 speeds, and the highest spindle speed available is 4,150 r.p.m.

The material to be machined is hard brass, so the highest spindle speed will be used.

In checking the capacities, we find that the No. OG H.S. Machine will accommodate up to % inch round stock, has a turning length of 1¼ inch, and a feeding length of 2 inches. The size of this part is well within these dimensions.

For an accurate chuck sketch, reference should be made to Fig. 19 where it will be noted that all the diameters are turned, and the forming or chamfering tool on the front slide breaks the corners on each side of the head. There are two reasons why the 14 inch diameter is turned instead of formed; first, it usually requires less time to turn than to form, and second, the close tolerances can be more readily met if roughing and finish turning operations are performed.

Considerable care will be required when determining the order of operations which will comprise the best method to be used in making this part. As mentioned before, there are several choices that could be used, but the method outlined in Fig. 19 illus-

trates a preferred technique.

One method that might be used would be to rough turn the 14inch diameter, then turn the 11/64-inch diameter, followed by the finish turning of the 14inch diameter. However. if the 11/64-inch diameter is selected as the first diameter to be turned, it reduces the length of travel for the rough turning operation, thereby reducing the number of seconds required to make the part.

To decide where the turning of the 5/64-inch diameter should be placed in the order of operations requires some consideration. It could follow the turning of the 11/64-inch diameter at the beginning of the order of operations, but this would require clearance time between the last turning tool and the cross slide tools.

However, if the turning of the 5/64-inch diameter occurs just before the cross slide tools start to function, no clearance time will be necessary because this operation takes place near the end of the part. The cut-off tool is shown at the end of its cut in Fig. 19 and it is apparent that no interference would occur between the box tool and the cross slide tool holder.

The possibility of overlapping the various cross slide and turret operations should be considered at this time. It can be seen that the chamfering operation will be performed while the piece is being cut off. At first thought, it seems apparent that a portion of the cutting off operation would be overlapped with the turning

Note (A) No Cut-Off Tool Marks Permissible 1/4 ±.001 11/64 A Hard Brass 5/64 1 3/8 B & S #0G H.S. (36 Sp.) A.S.M. 4150 R.P.M. Fig. 19 Order of Operations Throws Feeds Revs. Feed to Swing Stop 27 Clearance 27 Turn 11/64 Diam. and Dwell .885 .008 110 27 Rough Turn 1/4 Diam. .260 .012 22 27 Finish Turn 1/4 Diam. and Dwell. 260 .010 30 27 Turn 5/64 Diam, and Dwell .260 .005 56 Cut-Off and Dwell .002155 TOTAL *508

* Refer to B & S book Page 280. Under the 4150 column, the nearest number of revolutions to 508 is 519. Under the column "Time in Seconds" 74s seconds are shown.

of the 5/64-inch diameter, as the chuck sketch shows that it is feasible.

However, it should be realized that if these operations were overlapped, it would be impossible to meet the requirements of "Note A" in Fig. 19. It is evident that if the cut-off tool started its cut while the 5/64-inch diameter was being turned, upon pressure from the turret being removed, a second cut could be expected to appear on the cut-off end of the part which would not be in accordance with "Note A."

The tools required to make this part will include a roller back rest box tool to turn the 11/64-inch diameter, a balance turning tool to rough turn the ¼-inch diameter, and a box tool

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—known as Style 1—with a vee type of back rest for the finishing cut. The Style 1 type of box tool could be used also for the turning of the 5/64-inch diameter, but there would be some possibility of the work tending to jump above the tool, especially if the usual rate of feed were used. To avoid this trouble, a box pointing tool should be used, and the bushing, located ahead of the blade, would thus hold the work firmly while the small diameter was being turned.

The chuck sketch in Fig. 19 shows a cross section of the blade which turns the 11/64-inch diameter. The angle on the side of the blade provides an aftercut to permit the balance turning tool blades to advance on the work before taking the heavy cut. The blade used for the turning of the 5/64-inch diameter is also shown at the end of its cut. The angle on this blade chamfers the corner of the 11/64-inch diameter.

The throws and feeds for the cutting operations should now be determined. The feed for turning the 5/64-inch diameter will be found by referring to Page 248 in the treatise. Based on a depth of cut of 3/64-inch, a feed per revolution of 0.010 inch is selected. When turning small diameters, it has been found advisable to reduce the feed considerably. For this operation, a 50 per cent reduction is made.

The feed to be used for cutting off the part may require some explanation. When the aftercut on the cutoff tool is considerable, two feeds are usually used; a cut-off feed for a certain distance, followed by a slower feed when the wider portion of the cut-off starts to cut. Two feeds would not be advisable for this part, because the difference in feeds would be discernible on the end of the part. This would not be in accordance with "Note A" on the chart.

It will be noticed that a dwell is allowed for all the turning operations

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15	stone	- 3 layers	25.00	-

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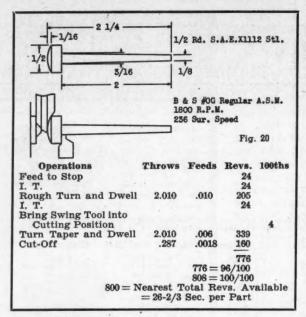
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with the exception of the rough turning of the ¼-inch diameter. This dwell, consisting of four revolutions, is always added at the end of a forming cut or an end-cutting operation where it is desirable to "clean up" the cut by allowing a few extra revolutions of the spindle.

We now divide the feeds into the number of throws to find the number of cutting revolutions required. these are added the revolutions to be allowed for feeding stock indexing the turret. By referring to the B & S treatise, on Page 258, we find that 1/3 of a second will be required for the feeding and for each indexing. There are 4,150 revolutions per minute used for this job and the revolutions per second will equal 69. One-third of this amount is 23. Four extra revolutions are added to facilitate the setting up of the job. It will be noticed that the 23 revolutions may be found at once by referring to Page 280 of the B & S treatise under the 4,150 r.p.m. column.

All revolutions are now added and, referring to Page 280 in the treatise, we find that 7½ seconds will be required to make the part.

For machining the part shown in Fig. 20, the plain hollow mill and the swing tool will be used. These turning tools have not been discussed previously. A careful study of the workpiece reveals that no close dimensions are shown. The only unusual feature of the part is the rather long taper.

The B & S No. OG Regular Automatic Screw Machine will be used. This machine has a maximum turning capacity of 2 inches and a

feeding movement of 3 inches. The largest stock that can be taken through the spindle is $\frac{1}{2}$ inch, therefore this size machine is well adapted for the making of the part shown in Fig. 20.

The material specified is SAE X 1112 steel, otherwise known as high sulphur steel. When using this material, a surface speed of approximately 225 feet per minute can be used. This compares with 150 feet per minute when machining screw stock. If a spindle speed of 1,800 r.p.m. is chosen for machining this part, the resultant surface speed for the rough turning and cutting off operations will be 236 feet per minute.

In planning the chuck sketch, it will be noticed in Fig. 20 that the cut-off tool forms the oval head of the part and also chamfers the front end of the next piece.

In determining the order of operations, a person not familiar with screw machine work might assume that the swing tool blade, shown at KRW HYDRAULIC ARBOR PRESSES

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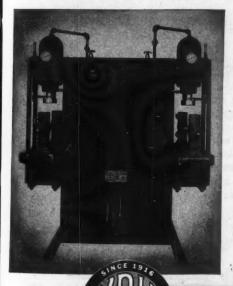
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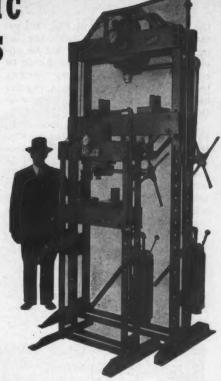
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Standard Hydraulic Presses in 25, 50 and 75 ton capacities. Special Presses engineered for specific war production needs.





The exclusive design features which have given KRW Standard Presses their reputation for speed and efficiency are available to war production manufacturers who require presses of special design. The illustration above shows a special, extra high 75 ton KRW Press in comparison with the Standard 25 ton unit. Opposite illustration shows a special, 4-man operated, air-oil Press used for bomb loading.

... KRW also builds bench-type Arour Presses in 1/2, 1 and 3 ton capacities.



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the end of its travel in Fig. 20, removed all the material from the ½-inch diameter. This would not be advisable because a swing tool should be considered as an auxiliary turning tool, to be used only when a regular box tool cannot perform the operation.

The picture of the swing tool in the Brown & Sharpe catalogue shows that the arm of the tool carrying the blade is held by one bolt, and it will be seen that the taking of a heavy cut with this tool is not advisable. With this thought in mind, a roughing tool will be used to turn a fig-inch diameter, leaving a small amount of material to be removed by the swing tool. By using this method, a more accurate taper turning operation will be obtained.

In considering the overlapping of the cross slide and turret slide tools it will be noticed that the cut-off tool can start its operation while the taper is being cut. Whether this should be done or not would depend on the requirements of the tapered portion. When the cut-off tool commenced its cut, it is possible that a slight step should be made on the taper at that time. If this were objectionable, it would be advisable to retard the cutting-off operation until the swing tool blade had completed its cut. For this example the latter method will be used. After cutting off the part, the cut-off tool chamfers the front end of the next piece.

For the rough turning operation, a roughing hollow mill will be used. This tool is made from round of stock and has three end-cutting teeth. It also has a hole through it of the same size as the diameter to be turned. This type of tool, shown in the B & S catalogue, is used for turning a long, slender diameter. It can be seen that the hole in the hollow mill acts as a support so that the piece cannot

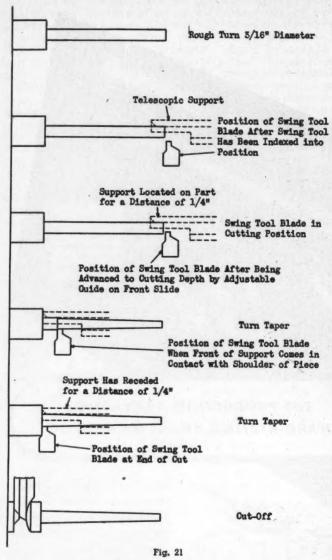




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spring away. The tool is usually held in a B & S floating holder to help the operator to centralize it when setting up a job.

The tool to be used for turning the taper will be a standard B & S swing

tool. To actuate the swinging arm of this tool, a standard adjustable guide will be used. This guide is located, on the front cross slide. When the swing tool blade is required to function, the front cross slide comes forward and the guide pushes or feeds the blade towards the work.

For this job the guide will then pause while the blade advances towards the spindle and turns the taper. The front plate on the guide may be adjusted to turn any taper within a certain range. This guide is also useful when straight turning is to be performed with a swing tool. It will be noted that the swing tool blade has a step on the left side which breaks the sharp corner on the head of the part.

Figure 21 includes diagrams which have been

prepared to show the various movements of the swing tool operation. It will be seen that a special type of support is used in the hole of the swing tool. The front end of this support recedes when it comes in con-

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This 32-page ready-reference machining manual has the answers—on turning, parting, forming, drilling, reaming, tapping, threading and milling—for more than 40 copper base alloys, from free cutting yellow brass all the way to copper and the tough bronzes. It also contains tables of compositions, physical constants, physical properties, convenient weight tables and references to Standard Specifications.

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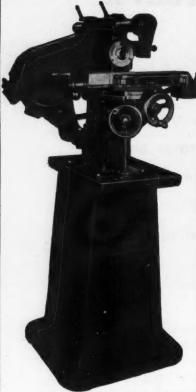




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tact with the end of the turned diameter.

The function of the support is to steady the work while the taper is being turned, and the telescopic arrangement allows the support to enter onto the work before the blade commences the cut. This is shown clearly in Fig. 21, in the second diagram. The fourth diagram shows the front of the support touching the shouldered portion of the work, with the swing tool blade ¼ inch from the end of its cut. The support will, therefore, recede for this distance.

The throws for the operations of rough turning and turning the taper will be determined by adding the amount to be turned to the 0.010 inch allowed for approaching the work. The throw for cutting off the part will consist of 0.005 inch to approach, plus half the diameter, plus the depth of the angle on the cut-off tool, plus 0.005 inch for the heel of the cut-off tool to pass the center of the spindle.

In choosing the feed for the rough turning operation, the amount of step or chip will be considered. In this case, the amount of chip removed equals 5/32 inch. The B & S treatise recommends a feed of 0.009 inch per revolution when turning mild steel with a hollow mill . This feed can be increased slightly when high sulphur steel is used.

In selecting the feed for the taper turning operation, the amount of chip removed by the blade at its greatest depth will be considered. This depth equals 1/32 inch and, on Page 248 of the B & S book, a feed of 0.006 inch per revolution is recommended.

The feed used for a cutting off operation when machining mild steel is usually 0.0015 inch per revolution, but this can be increased to 0.0018 inch when high sulphur steel is being machined.

When the throws and feeds for the

NO PLACE FOR SCIENTS

...in the Machine Tools for Creating War-Vital Precision

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Machine tools like the Robot Surface Grinders are important "weapons", not only on the production front, but on fighting fronts throughout the world. Repairing and rebuilding mechanized equipment requires shaping and sizing innumerable metal parts to accurate dimensions. For this vital job, performed under the worst possible conditions, only machines of lasting, dependable precision are suitable.

Because it might fail under stress, and delay the return of indispensable fighting equipment to battle, no "doubtful material" can be included in such machines. That is why Parker-Kalon Quality-Controlled Socket Screws are "on the preferred list" of so many machine tool manufacturers.

The unparalleled check-routine supervised by the Parker-Kalon Quality-Control laboratory eliminates "doubtful screws". . screws that look all right but fail to work right. You can be sure of the physical and mechanical characteristics of P-K Socket Screws . . yet they cost no more! Parker-Kalon Corporation, 198 Varick Street, New York, N. Y.

Assembling the Robot Surface Caladar requires over 100 Seches

Assembling the Robot Surface Grinder requires over 100 Socket Screws - about 60 to hold gears. The Robaczynski Machine Corp. of America, Brooklyn, N. Y., manufacturers of this equipment, get insurance against trouble by specifying "Parker-Kalon"





Quality-Controlled Means . . .

Complete test and inspection covering. Chemical Analysis, Tensile and Torsional Strength: Ductility: Shock Resistance under Tension and Shear: Hardness, Head diameter, Height and Concentricity; Socket shape, size, depth, and centricality; and Thread fit cutting operations have been determined, the feeds can be divided into the number of throws to obtain the number of cutting revolutions. The number of revolutions to be allowed for feeding the stock and indexing the turret will then be chosen. This may be done by referring to Page 278 of the B & S treatise under the column headed by the 1,800 r.p.m. To the 20 revolutions shown, 4 extra revolutions are added to facilitate the operator in setting up the machine.

It will be noted that in the order of operations the time required to bring the swing tool into position is given as 4 hundredths. It has been found from experience that this amount is usually ample for this movement of the cross slide and can be used for estimating purposes.

All the revolutions are added, making a total of 776. The time for bringing the swing tool into position requires 4 hundredths, therefore, 776

revolutions will equal 96 hundredths. By multiplying 776 by 100 and dividing by 96, the total will equal 808 revolutions. Referring to Page 278 of the B & S book, under the 1,800 column, it will be seen that the nearest number to 808 is 800 revolutions. At the column to the right, the time in seconds is shown as 26% seconds to make one piece.

Handbook for Wartime Care of Centrifugal Pumps. Published by the Allischalmers Mfg. Co., Milwaukee, Wis., this 28-page booklet includes maintenance information which is applicable to all makes of centrifugal pumps. Topics treated are: How a change in liquid can "blitz" a pump; easy ways to find leaks; common mistakes in packing stuffing boxes; how tight is "too tight" for a gland; how to figure head; how to protect pumps against cavitation; the vital role of water as a lubricant in pumps; quick diagnosis of pump ills, and so on. The booklet is interestingly illustrated throughout and contains no advertising. Copy free upon request.



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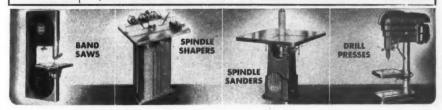


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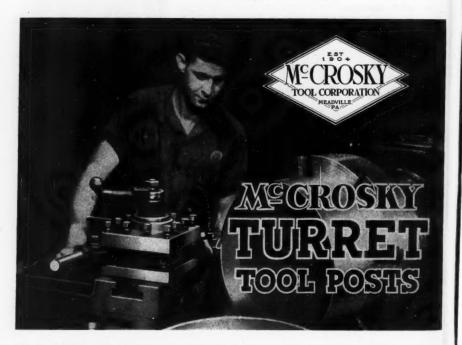


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months, six years, or not for six decades, but of this you can be certain: One day, just as sure as the earth revolves about the sun, every form of power machinery in use today will be totally obsolete.

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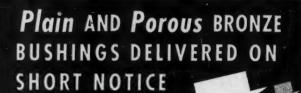
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Salvaging Scrap at General Electric

By J. R. HIGGINS and C. R. HALSTEAD Schenectady Works, General Electric Company

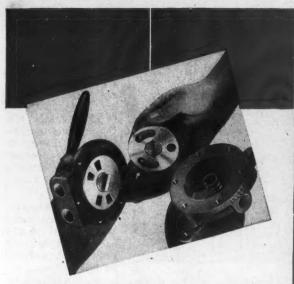
THE salvage program at the Schenectady Works is not a one-week or one-month campaign any more than this is a one-week or one-month war. Substantially the same procedure of salvage operations has been followed for years. However, today a more meticulous routine is in effect as an important means of meeting the critical materials problem.

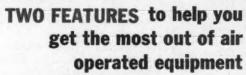
It is no military secret that the G-E Schenectady Plant manufactures a wide variety of war material. A great many alloys of ferrous and nonferrous metals are required for various types of apparatus. And scarce and expensive metals such as tungsten, molybdenum, silver, nickel and chromium are used in many of them.

In view of this situation, close cooperation by all personnel of each department is vitally important to prevent the contamination of material in and at the machines. The importance of keeping scrap clean at the source is constantly emphasized, otherwise the salvage department could not economically segregate scrap to the proper sales class.

By friendly collaboration between factory supervision and the salvage department, segregation lists have been developed. These comprise groupings of metallics having like analyses and showing specification numbers. They provide a ready reference for salvage handlers when sending scrap to the salvage department. Fur-

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packing maintenance troubles. The bronze disc that controls air flow is ground and lapped to make a perfect seal with the seat which is similarly finished. Wear is negligible; these valves stay on the job without maintenance. If necessary after long service, a simple re-lapping operation quickly restores the original efficient seal.

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Sorting Brass and Copper Scrap. Note Sifter for Fine Punchings

thermore, standard nomenclature is insured in tagging the various items.

Let us trace the path traversed by scrap in the Schenectady Works. In order to guard against mixtures, small containers are placed at each machine in departments where a variety of small parts made from different alloys are machined. These containers are stenciled with the alloy number of the metal being machined. When filled, they are emptied by porters, the contents being dumped into large containers at a central location in the department.

Each large container bears a detachable label with a corresponding alloy specification number. When full, four large containers of like scrap are placed on a pallet and thence by fork lift truck onto a trailer for transportation to the salvage department. At time of loading, colored scrap tags are affixed to each container. When properly executed, each tag indicates the class of scrap, the name of the department, the weight, the date, and the name of the responsible foreman. Upon arrival at the salvage depart-

ment, the trailers are unloaded quickly and conveniently by fork lift truck. By this method the pallets are delivered to the correct processing station with a minimum of time and effort.

The different methods by which scrap is processed in the salvage department may be enumerated as follows:

 By sorting to the highest sales class possible as required by government regulations and good economic practice.

By shearing and gas cutting materials for segregation and convenience in handling.

3. By dismantling assembled apparatus.

 By bundling copper wire for convenient use in the works foundry.

By baling sheet steel, copper turnings, sheet brass, and aluminum skeleton for convenience in handling and shipping.

6. By crushing steel turnings.

- By magnetically separating ferrous from non-ferrous turnings in a separator.
- By slitting scrap cardboard for use in interworks shipping departments.
- By grinding scrap asbestos for re-use as insulation on steam pipes in the plant.
- By reclaiming metals from ashes taken from the pit under boilers where waste material is burned to generate steam. These ashes



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are passed through a ball mill and over a concentrating table. Coarse ferrous particles are magnetically separated from non-ferrous metals. This operation produces a large quantity of blast furnace material and also copper smelting.

 By burning insulation from wire, cable, motors, transformers, and

so on.

 By reclaiming babbit, lead, tin, and solder from turnings and drosses for re-use in the Schenectady Works.

 By recovering metals after burning refuse on the dump.

By stripping rubber and synthetic insulation from wire.

Each of these salvage operations has proved its worth. For example, in the dismantling operation which reduces assembled apparatus into its component parts and thereby to its alloys, about 2,000,000 pounds of ma-

terial comprising approximately seventeen sales classes were salvaged in 1942.

Standardized nomenclature of sales classes is attained by three means:

- Sales class cards which describe the material, show the specification number, and, where feasible, the chemical analysis.
- Printed charts are mounted near the work stations, containing a summary of the information shown on the sales class cards and are supplemented with information concerning tests that are applicable.
- Printed vouchers to be attached to processed material are provided the operators. These serve to classify the items for the weighmaster and are the basis of the inventory record.

Properly designated storage space is provided for each sales class and a perpetual inventory is maintained.



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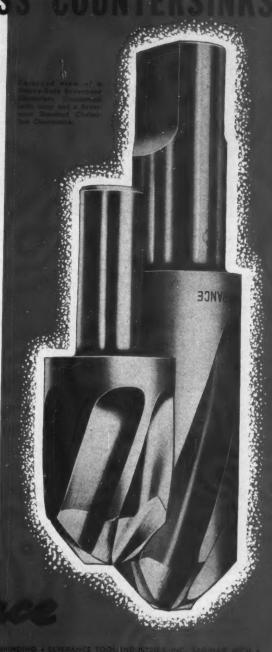
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Inventory record cards bear the sales classifications, entries, withdrawals, current balance and disposition. Thus, a separate inventory record card covering each item is on file at all times to facilitate the sale and shipment of salvaged material.

Since it is increasingly difficult to obtain supplies, it is more important than heretofore to accumulate articles that may be returned to service in the plant. This practice also serves to conserve new material. Some of the articles saved are: structural steel. gravity conveyor sections, expanded metal office sections, doors, motors, blowers, conduit pipe, valves, switch boxes, five-gallon pails, clothes lockers, cabinets, trucks, tables, bench

vises, cables, tools, castors, belting, and pipe fittings.

The methods used to reclaim broken or damaged tools comprise a story in themselves, and represent an interesting array of ingenuity. As one example, nickel steel

tool shanks were reclaimed by removing the carboloy tips and reforging the shanks for smaller-sized tools.

"Zinc in Wartime" is the title of an unusually interesting 28-page catalog now being distributed by the American Zinc Institute, Inc., Dept. W, 60 E. 42nd St., New York, N. Y., describing the use of zinc in the production of war materiel, farm and railway equipment, and so on. The catalog is profusely illustrated throughout with actual photographs of war equipment in which zinc plays a part in the production; namely, planes, communication systems, shells, guns, ships, searchlights, life rafts, tanks, trucks, jeeps, pontoon bridge sections, and so on. The catalog also includes illustrations showing the variety of operations involved in producing zinc. Copy free upon request.



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CP Universal Electrics are distinctly production tools—designed and built for steady service on busy production lines. But, sturdy though they are, CP Universals should not be abused, and should be given reasonable care. A few simple precautions like the four illustrated on this page will help you get maximum service from your CP 806 and 815 Drills and other CP Universal Electric Tools.

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Every 200 operating hours, clean gear case, inspect gears, repack with grease two-thirds full.



Inspect brushes every 200 operating hours.

Blow out dust and chips from brush rigging.



Never clamp the housing of an electric tool.

If you must use a vise, clamp the tool handle.



Never pry off gearcase cover with screw driver.

Enock spindle on wood and cover will fall off.

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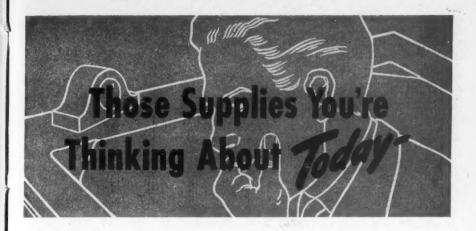
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Primer Cap Die

A presentation of the design of a compound progressive die of unusual design.

By C. W. HINMAN Designing Engineer

THE accompanying photograph shows a compound progressive die in which the work is fabricated from an aluminum strip as it is passed over a series of spring pads mounted over the die shoe. The punches are mounted on the die shoe and the dies are on the punch holder. The spring pads are flush with the punch faces in the consecutive stations and are depressed on the down-stroke but rise and strip off the work on the up-stroke.

This interesting die was designed and built by the Moore Special Tool Company, and is used in a 50-ton capacity press. The aluminum strip is fed from a coil of stock mounted on a reel. The strip is passed over the dies by its contact between a pair of revolving feed rolls which are mounted in front of the receiving end of the die, between the press and reel. The finished work is called a "primer cap," but just how it is used is, of course, censored information.

This Die Has An Auxiliary Punch and Die

A unique feature in this press tool is the unusual design, which includes a secondary punch and die and a gluing operation. The second punch and die are located crosswise to the main die and are shown in connection with the diamond-shaped spring stripper pad at the right end of the lower die.

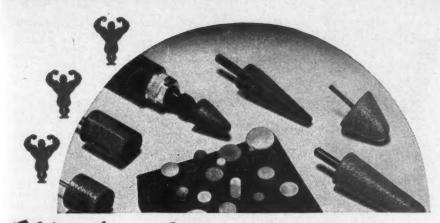
This secondary die is a full unit, but is attached entirely on the lower die. Stripping is done by two coiled springs, one of which is shown in this unit.

The secondary die cuts round disks from a strip of tinfoil which is fed by a small reel behind the unit. The punch in this unit pushes the cut disk down over a small hole pierced in the end of each primer cap. After the small hole is pierced in the cap, a gluing device, which is automatically operated by the machine, dabs a bit of glue around the pierced hole.

Following the gluing operation the work is advanced between the secondary punch and die, and during the next down stroke, air pressure is introduced through the stud shown at the center of the diamond-shaped opening in the punch holder. The air pressure passes through a hole in the punch that blanks the tinfoil disk and forces the disk to adhere over the glued hole pierced in the primer cap. Without the air pressure the disks would fail to adhere as desired; on the contrary, they would follow up with the punch.

Guide Posts and "Bumper-Pins"

The work strip is fed from right to left in this die, but unfortunately in the illustration it is shown turned "end for end" in regard to its true operating position. The punches and dies are ac-



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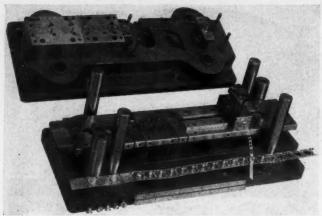
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Compound Progressive Die for Mass Proouction of Aluminum Primer Caps. Note the Secondary Punch and Die Oper-ating at Right Angles To the Primary Die

curately aligned by the four substantial guide posts, the two shorter pins being bumper-pins. Bumper-pins serve to check the punch holder descent so that at the completion of the down stroke the faces of the punches and dies are at their proper working heights. Bumper-pins are an aid when setting up the die in the press, as they determine the closed height of the die. Further, they compensate for any loose action in the ram which may have been caused by a worn

Progressive Dies Must Locate Work Accurately

In designing progressive dies it is necessary to relocate the strip by pilot-punches that enter previously-

pierced holes, the purpose of this being to register the work accurately in each of the progressive stations before the other punches descend far enough to contact the strip. In

the picture it is seen that the pilot holes are pierced in the first station, at the left end of the die, and that the scrap strip shows a continuous line of pilot holes near each edge of the strip.

Order of Operations

In operation, beginning at the left end of the die in the picture, the strip feeds through two compound blanking stations in which the blank is not entirely severed from the strip. Five pilot punches located here register the strip and work as described previously. Next in order are four drawing die stations, following which the small hole is pierced in the center of the cap. Next, the strip enters between two parallel guides that straighten the strip and align the work.



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Machine Tools

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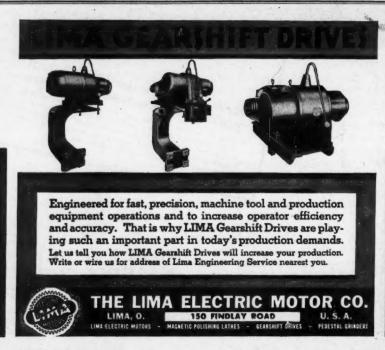
SPRINGFIELD. VERMONT, U. S. A.

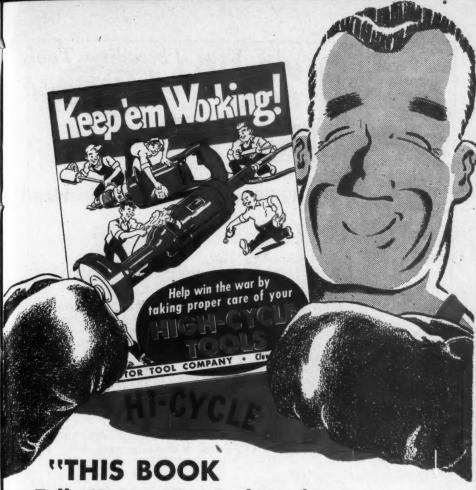
Manufacturers of a Ram and Saddle Type Universal Turret Lathes - Fay Automatic Lathes - Automatic Thread Grinders - Optical Comparators -Automatic Opening Threading Dies and Chasers. At the third station beyond the piercing station, a recess is cut in the punch holder, and it is through this recess that the gluing device operates to dab glue around the pierced hole in the cap. Several idle stations follow the gluing operation; these permit the glue to partially dry or become "set" to receive the tinfoil disk. After the work passes under the punch that cuts and attaches the tinfoil disk, it enters the last station in the die, where the cap is blanked out of the strip and pushed through the die.

There are 18 stations in this die—which is an unusually large number for progressive dies—but only 10 stations are active. The scrap strip and five of the finished primer caps are shown in the foreground of the picture along with a 12-inch scale that indicates the size of the die. The scrap strip is similar to those de-

signed for producing radio grid caps which are attached in radio tubes and of which millions are used. The orders placed by Government Arsenals for these primer caps were so large that the cost of the tool was a secondary factor, high uniformity, accuracy of the product, high output and frequent deliveries being the primary objects.

by the Jefferson Machine Tool Co., 750 W. 4th St., Cincinnati, Ohio, this eight-page catalog describes and illustrates the company's "Bulldog" precision milling machines with screw and power feed and quick-acting hand lever feed; conversion attachments for lathes (4-tool post turret, 5-tool tailstock turret, and adjustable pull feed); endless belt sanding machine; swing frame grinding and polishing machine; gyratory foundry riddle, and milling machine attachments, which include plain, tilting, and swivel base dividing heads, plain and swivel vises. Copy free upon request.





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WHEN you keep your portable tools up to par, you make Hirohito boil. This Rotor Maintenance Manual gives 12 recipes for taking proper care of your HIGH-CYCLE tools to keep them putting the heat on the Axis. This book and a handy wall chart are available to plants with good appetites for Victory. Send for your copies today.

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Be sure the cutting face grind and threading speed is suitable for the material being threaded.

Heads and Taps should be kept in good repair.

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Misalignment is one of the greatest causes of Chaser breakage and poor threads.

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Use the best lubricant you can for the material being threaded. Keep it clean and free from fine dust and grit.

If you need new Die Heads and Taps, Geometric has them. Ask for catalogue.

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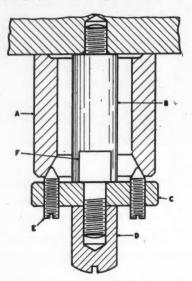
SOUTH DAKOTA



Improved Toolmaker's Button

By R. RICHARDS England

TOOLMAKER'S buttons are normally secured lightly to the work to which they are applied; then they are tapped gently into place and their holding screws are tightened.



Improved Toolmaker's Button

The gentle tapping of the button into place is often rather tedious and then when it has been done there is a

tendency for the button to shift when its screw is tightened.

These disadvantages are eliminated by the use of the type of button shown in the accompanying illustration. This button, however, possesses one disadvantage of its own, that is its construction prevents it from being made in sizes less than about one inch in diameter.

The button A, which is hardened, resembles an ordinary toolmaker's button except in that one end is countersunk to an included angle of 60 deg. The ordinary cheese headed (filister-head) screw B is replaced by a stud that is threaded on both ends so that it can be screwed into the work. and so that a substantial washer C can be clamped to the free end of the stud by means of a cap nut D. The washer is tapped to receive four small screws E, each of which is hardened and has a conical end corresponding to the angle of the countersink in the button.

To facilitate screwing the stud into the work, the body of the stud has two flats F on opposite sides so that a wrench can be applied—or the stud can be turned from hexagon stock.

In use the stud is screwed into the work at the approximate position, then the button, washer and cap nut are slipped over it and the cap nut is tightened lightly. The button can then be shifted in any direction to locate it in the correct position by adjusting the four conical-end screws.



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Oil is the life blood of every motive unit. In order to gain smooth, quiet operation; long, satisfactory bearing life, we must have the right amount of oil . . . in the right place . . . at the right time.

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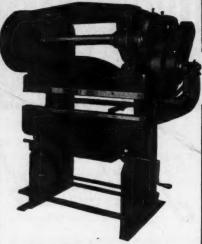
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The tapered screws co-act with the taper in the button to cam the button into position. Not only is the button easy to adjust, but the four screws serve to lock it automatically.

Hardwood Dowel Aids in Cutting Thin Rings

By A. H. WAYCHOFF

NEEDING a number of rings of various widths to be used for spacers, we decided to cut them from seamless tubing, but upon attempting

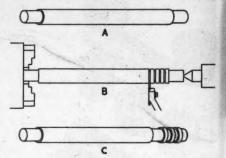


Illustration Showing How Hardwood Dowel was used in Cutting Rings from Thin Metal Tubing without Distortion

to cut the piece off from the tubing in the lathe it was found that the tubing lacked sufficient strength to stand up under the pressure of the cutting tool.



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To eliminate this difficulty we turned a hardwood shaft or dowel out of just the right diameter to be a push fit in the tubing. The tubing was pushed into place over the dowel A, then the dowel was chucked in the lathe and supported at the free end by the tailstock center as shown at B. The dowel gave the tubing sufficient support so that the rings could be cut, as shown, without distorting them. When the entire section of tubing had been cut into rings, the dowel was removed from the lathe and the rings were pressed off from the dowel. The rings are shown at C separated from the tubing.

Table for Estimating Volume of Pipe in Gallons

By W. F. SCHAPHORST

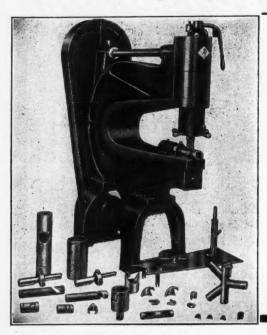
r sometimes becomes necessary to know the volume of a given length

of pipe in gallons. Tables that give such values usually indicate the volume in cubic feet, but the limit of the table is seldom great enough to cover a wide variety of sizes.

Shown here is a chart that gives the volume of all of the standard pipe sizes from 1/8 inch to 15 inches diameter in column A, and any length of pipe line from 0.1 foot to 800,000 feet in column Column C shows volumes from 1 to 1,000 gallons, which is sufficient to take care of most conditions.

In using the chart simply run a straight line through the figures for the pipe size in column A and the figures for the length of the pipe line in column B, carrying this line straight on through column C. At the point where the line intersects the line C the figures for the total number of gallons in the pipe or pipe line will be found.

Thus the dotted line shown on the chart shows that if the pipe size as indicated in column A is 21/2 inches and



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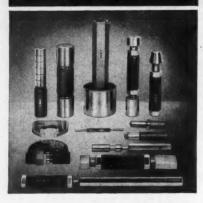
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Conversely if it is desired to know the length of a pipe or pipe line that will be required to hold a given number of gallons, or the size of the pipe necessary to hold a given number of gal-

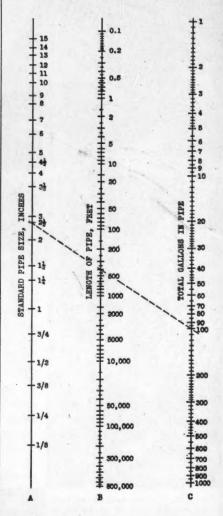


Chart for Estimating Volume of a Given Size and Length of Pipe in Gallons



If worms had wings ...

IF WORMS HAD WINGS, chances are our entire economy would collapse! All because their specialty—that of swallowing earth—is unique and indispensable!

The earthworms in a single acre of ground carry more than 18 tons of earthy castings to the surface in a year! Thus, by constant plowing, they make it possible for air, moisture and life-giving minerals to circulate...and so for all plant-life to flourish!

But if worms had wings, they'd never be satisfied with so plebelan an occupation as burrowing. They'd just fly around. And in the meantime, the whole world would saylo pot.

moral is plain: Specialization is of so great

importance that our modern world could not survive without it. Our democracy could not fight without it. Take machine tool production. We have overcome Germany's 7-year head start in about a year, and are even now outproducing the Reich in machine tools in the ratio of 5 to 1.

A potent factor in this production miracle has been the multiple spindle automatic lathe made by Cone. These titans of the machine tool industry are currently used in the production of so many different munition parts it would be difficult to list them all.

Remember that no make history are pindle Lathe.

It will continue to make history are propriet won!

ONE Automatic Machine Company, Inc., Windsor, Vermon

lons within certain limits of length, these figures can be discovered just as easily by working backwards. In other words, when any two factors are known, the third factor is quickly found.

Another way to use this chart is as follows: to determine the volume of a ½-inch pipe one foot long, the easiest way is to run a line through the 1/2 inch diameter as indicated in column A and the 10,000 figure in column B.

The intersection with column C gives the volume as 160 gallons, but that, of course, is for a pipe line 10,000 feet long. But merely pointing off four places to the left we have 0.016 gallons as the volume of 1/2-inch pipe one foot long.

Reclaiming Cylinder Packing in a Locomotive Shop

By W. H. LESTER

THESE illustrations presented here show the modern method of reclaiming worn cylinder packing of the sectional type. This type of piston ring has displaced the older snap ring, largely due to the fact that the latter will not stand up under superheated Several makes of sectional packing are in general use. All are expanded by a steel expanding ring, sometimes placed between the pack-



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FEATURES

Large size spindle with No. 9 B4S Taper. Large quill diameter with a travel of 4". Furnished with 1/3 h.p. motor.

The aluminum pulleys

provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes 1/16" to 4" end mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting. IMMEDIATE DELIVERY

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when lighting was improved

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ELECTRICAL EQUIPMENT manufacturer: Better lighting accompanied by five per cent reduction in errors.

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HEAVY MACHINE TOOL BUILDER: Better lighting reduces time required to rebuild a machine.

ELECTRICAL EQUIPMENT manufacturer: Time required for machine set-ups reduced.

AIRCRAFT PARTS manufacturer: Less time lost by workmen hunting for tools.

EASIER SEEING

LAMP manufacturer: Time for training new women operators greatly reduced.

SMALL MACHINE PARTS: Men can read scales and blueprints more easily at night than by daylight.

FACTORY OFFICE staff: Unable to keep up with increased work under old lighting, but now work is done without undue effort.

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ORDNANCE PLANT: Increased safety, especially when breaking in new labor.

SHIP BUILDER: New lighting reduced blinding effect of flashes from welding torches.

TEXTILE manufacturer: Decreased fire-hazard.

DECREASED FATIGUE

MACHINE PARTS manufacturer: Men on night shift gained weight.

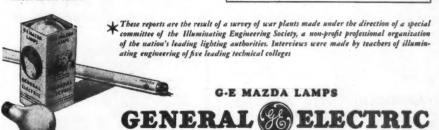
AIRPLANE PARTS manufacturer: Morale improved; fewer yard fights.

AIRPLANE PARTS manufacturer: Fewer headaches; aspirin tablet consumption decreased from 1000 to 600 tablets per month.

War Production Executives!

The 18 comments summarized on this page are typical of the wide range of benefits resulting from lighting improvements.

Lighting may seem like the least of your problems. But it may be the answer to some of your other problems. We'd like to take the lighting problem off your shoulders, by sending a Wartime Lighting Counselor to check your lighting and show you how it can be improved with the least possible use of critical materials. Call your nearest G-E lamp office. Or see your G-E lamp supplier or your electric service company. General Electric, Nela Park, Cleveland, Ohio.



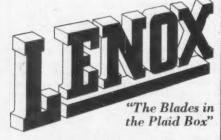


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AMERICAN SAW & MFG. CO. SPRINGFIELD, MASS. ing and bottom of the ring groove.

In the "Universal" rings illustrated, the expander fits into a groove cut in the packing. There are two general types; one equivalent to the old snap



Fig. 1—Radial Grinding Attachment for Reclaiming Cylinder Packing

ring and that may be used in the same grooves, and the step type of ring having an "L" section that laps over the piston head and forms the wearing portion of the piston. A specially-designed light-weight piston is necessary with this latter type.

Figure 1 shows a grinder equipped



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Pins



SPHERICAL Gaging Pins

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that involve no condition of parallelism . . .

YET PROVIDE greater ACCURACY IN PRECISION INSPECTION

A new contact principle* ... simple and practical

As mass production is accelerated, the need for faster, simpler, and greater accuracy of inspection becomes imperative. Snap gages are commonly used to control finer tolerances, but strain on the locking device distorts the frame thereby rendering the gage inaccurate. This distortion tilts the flat surfaced pins a few .0001" throwing them out-of-parallel to the common anvil, an important factor when tolerances are measured in .0001".

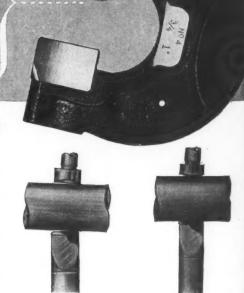
The STANDARD Super Snap Gage with its SPHERICAL gaging pins eliminates out-of-parallelism. This new spherical-contact principle involves no condition of sustained parallelism. The SUPER Snap Gage is easily set, requiring no simultaneous adjustment to a given dimension and to parallelism. It simplifies inspection, assures greater accuracy, and speeds production and inspection.

The return of out-of-parallel snap gages for correction is eliminated. Only pins and anvils need be held in reserve, instead of complete gages. The initial cost of the SUPER Snap Gage is no more. Pins are available as separate parts, to fit existing American Gage Design models. (*Pat. Pending)

Send for Illustrated Folder.

STANDARD GAGE CO., inc.
Poughkeepsie, N. Y.

MASTER CRAFTSMEN MANUFACTURING precision gages and instruments



Super Snap Gage with the

pin shank at the same angle

as in the diagram at the

left. Note that the contact

conditions are exactly the same as if the pin were not

Super Snap Gage

mounted in a bench stand for convenience

in checking.

tilted.

Conventional Snap Gage

with flat surfaced gaging

pins. The tilt is exaggerated

to make the diagram clear.

Note that only at their

edges do the gaging sur-

faces contact the piece be-

ing gaged.

IMMEDIATE

DELIVERY

from stock







For High Speed Steel Tools

Alundum and 38 Alundum "B-E" bond grinding wheels for sharpening tools and cutters of high speed steels and Stellite.

Open Structure grinding wheels for the jobs that require extra heavy stock removal or extra coolness of cut or both.

Fine grit grinding wheels for producing the high surface finish that greatly lengthens cutting tool life.

For engineering service and informative technical literature on tool room grinding, write direct or contact your Norton distributor.

NORTON COMPANY

WORCESTER, MASS.



HITCH YOUR WAR JUBS TO THIS

Itar Performer

On scores of urgent war production jobs, Bullard Mult-Au-Matics have increased output by 400% — and more. Where other machines have one spindle, the Mult-Au-Matic has seven . . . all working simultaneously, with independent speeds and feeds. They save precious floor space, use to the fullest your dwindling manpower. Quickly adaptable, they will bring these same economies to post-war production.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

Fig. 2—Pots Used in Fitting Up Sectional Cylinder Packing

with a radial attachment for truing up the outside of ring sections to any required radius. Rings may be used until worn down to within 3/32 inch of the ring groove in

which the steel expanding ring fits. The shop limit used in selecting rings for reclaiming is somewhat more than this. A test plate is provided, marked with concentric arcs and radii by which segments of the same length and radius may be selected to make up a given packing ring so that if segments become mixed up, they can easily be identified. Two master segments are



provided with dowel holes that position them on the expander so that all joints in the sections will be staggered.

In Fig. 2 are shown some of the pots that are used to fit rings. The inside diameter of the pot is bored in a series of steps, each step being inch less in diameter than the preceding step to correspond to any size of

Robertson's ECONOMY Power Hack Saws

..ATHDES

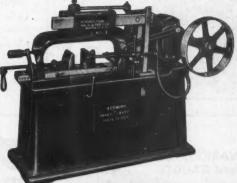
Rugged Simplicity Long Life
Hairline Accuracy High Speed
Long Blade Life Large Bearings

Few Adjustments Hydraulic Lift on Back Stroke

The machine illustrated is the ROBERTSON ECONOMY No. 3-B. Capacity: 6" x 6" with 6" stroke. Takes 10", 12", 14" blades.

There is a ROBERTSON ECON-OMY for every cutting job.

Write for information and delivery dates.



W. ROBERTSON
ACHINE & FOUNDRY CO., INC.

5.2 RANO ST.

BUFFALO, N.

locomotive cylinder for which rings might be needed. These pots are made from the discarded ends of cylinder bushing castings. After being reclaimed, a cylinder packing ring is wrapped securely with wire and burlap and then sent to the erecting floor or the store house.

Protecting Holder for Tools

By C. F. FITZ

IN these days of priorities, when tools are very hard to replace, it becomes necessary to devise various ways and means of increasing the life of the tools that we have.

We were having considerable trouble with our counterbores, end mills and reamers, because the cutting edges were being damaged in handling. These difficulties were overcome by making holders, similar to the one shown in the drawing. The

holder consists simply of a block of wood with a hole drilled in it to receive the tool. A lid A. made from sheet metal and attached to the holder

with a wood screw. prevents the tool from coming out of the holder in case it should be tipped or dropped. B is a piece of sheet metal with a hole in it which is attached to the holder so that it can be hung on a hook. With this arrangement, the holder requires less storage space than would be required to store it otherwise, and also simplifies the handling of same for the toolroom attendant. The size and name of the tool for which it is made is stamped on the face of the holder.

The safety feature of the holder is also worth noting: the mechanic runs no chance of receiving minor cuts in

for Tools

handling the tool from the toolroom to his machine.

Accurate Hole Transfer Made Easy With **NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. sizes U.S.S. Inexpensive Last for years. for Circular.

NIELSEN TOOL & DIE COMPANY 1960 W. Eleven Mile Rd. Berkley, Mich.



Protecting Holder

May

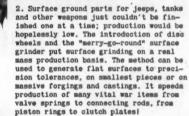
This Merry-go-round has gone to war!

1. It takes a lot of parts to make a Jeep. And this "merry-go-round" has the job of grinding some of those parts (those with flat surfaces)...in a hurry!

By rotating a large number of pieces beneath a Carborundum made disc wheel, it surface grinds them in a fraction of the time required by older methods. This process is one which Carborundum helped develop.









Carborondon is a registered trade-mark of and indicates manufacture by The Carborondon Company, 3. Careful supervision of grinding operations is vital today to conserve materials and time. The abrasive disc wheel is a "Weapon of Production" and should be properly used for maximum effectiveness. The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM

Saving the life of one or two high speed cutting tools today more than offsets the cost involved in the making of these holders.

Severance Midget Cutter Gage. Said to be especially useful to purchasing and departmental heads as well as receiving and shipping departments and tool crib clerks, a comprehensive midget cutter gage made of heavy two-color cardboard is now being offered by Sev-



Cut Set-Up Time 75% through use of the **New Advance Clamps** (the only T-slot clamps) Clamp directly over work. For use on all machines with T-slots. Standard and Heavy-Duty type.

Write for circulars.

ADVANCE MACHINE WORKS 3727 Weisser Park Fort Wayne, Indiana

is designed to provide information con-cerning tool diameters, radii, number of teeth per inch, angles of cutter teeth, decimal equivalents, recommended operating speeds for midget milling cutters, and so on.

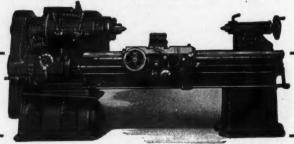
A Severance Midget Cutter Gage will be sent free of charge to persons writing Dept. A, Severance Tool Industries, Inc., Saginaw, Michigan.

erance Tool Industries, Inc. The gage

"Womanpower"

The importance of "womanpower" in the victory effort is evidenced by the figures that result from a study made in the plant of the Formica Insulation Company, Cincinnati, Ohio. In September, 1940, the Formica plant personnel, according to the time-clock and payroll, was in the proportion of 86 per cent male; 14 per cent fe-male. By January 1, 1942, the ratio was 76.4 per cent male, 23.6 per cent female. Came January 1, 1943, and it was 52.2 per cent male; 47.8 per cent female. The payroll of February 6, 1943, showed 49.48 per cent male and 51.52 per cent female.

E & EMMES



& EMMES MACHINE TOOL CO. CINCINNATI OHIO

208



THE ANSWERS TO QUESTIONS LIKE THESE:

What is "Gear-Shaving"?

How does it work? How accurate is it?

How does it compare with other methods?

Where Can It Be Used?

What kind of gears can be shaved? Who is using "gear-shaving" today?

How many machine types and sizes are there? How big a gear can be finished by "shaving"? How small a gear can be finished by "shaving"?

What About Cost?

How many different gear sizes and types can be finished on one machine?

When should a rack or a rotary machine be used?

What tool life can be expected? What does it cost to shave gears?

How Do You Use It?

How do you set up to shave different gear types?

What controls gear accuracy in "gear shaving"?

What machine type should be used for any given class of gears?

How does it affect gear design?

How does the use of gear-shaving affect preliminary gear cutting operations?

What About Curve Shaving?

When should "curve shaving" be used?

When should "curve shaving" not be used?

These and numerous other questions are answered in a new booklet just made available by Gear Production Headquarters. Write for a copy on your company letterhead. Ask for Manual No. GF-43.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD . . . DETROIT, U. S. A.





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Multiple Unit

TYPE MU-55 MUFFLE FURNACE

Two Type MU-55 Multiple Unit Muffle Furnaces in the analytic of grid festing laboratories of one of the country of foremost steet suppliers.

For general laboratory and light tool room work, the MU-55 Multiple Unit Muffle Furnace, with controlling pyrometer, provides a sturdy small furnace well adapted to general service. It is used in many of the large steel and other industrial laboratories for test heat treatments. Bulletin HD-637 has all the details — send for your copy.



Type MU-55 Muffle Furnoce.

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LABORATORY FURNACES MULTIPLE UNIT ELECTRIC EXCLUSIVELY

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Insist on

BARNES



BARNES BLADE &

Barnes uniformity. Careful inspection guards the high quality of every Barnes hack saw blade and band saw you buy. Ask for Barnes by name when you order from your Mill Supplies Distributor.

W. D. BARNES CO. INC

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"E" FOR EXCELLENCE

in production of the tools that safeguard the accuracy of American Industry . . .

We, at The Lutkin Rule Company, are proud to have received the Army Navy Production Award in recognition of the quality and quantity of precision measuring tools we have produced. Scarcely a single part of the vast supply of war equipment America today is producing can be made without the aid of precision tools, measuring tapes or rules.

In accepting this award, we pledge ourselves to ever greater production efforts until final and complete victory has been achieved.

PRECISION TOOLS - TAPES - RULES
SAGINAW, MICHIGAN NEW YORK CITY

NEW SHOP EQUIPMENT

Morey Model No. 11/2 Duplex Deep Hole Drilling Machine

Designated as the Morey Model No. 1½ Duplex, a double spindle deep hole drilling machine designed primarily for drilling 37 mm. gun barrels has been brought out by the Morey Machinery Co., Inc., 410 Broome St., New York, N. Y. The machine can also be used to drill and ream other types of work requiring holes from ½ to 1% inches in diameter.

The Morey Model No. 1½ Duplex Deep Hole Drilling Machine is powered by means of a 10 h.p. motor located in the base of the head. Power is transmitted from the motor through V-belts and pick-off gears to spiral bevel gears mounted on the spindle of the machine, the pick-off gears providing for variations in spindle speed.

The work to be drilled is held in chucks, with the drilling tools themselves being held stationary in holders on the carriage of the machine while the work revolves. The carriage is operated in power traverse movement by means of a hydraulic cylinder. Variations in feed are obtained by controlling the quantity of oil delivered to the cylinder. A single directional lever is used to control the carriage feed and power

traverse movement in each direction. The carriage is equipped with safety



Close-Up View of Drill Holder Carriage of Morey Model No. 1½ Duplex Deep Hole Drilling Machine

devices which automatically stop the entire machine in the event the drill in either one of the holders slips or a drop



Morey Model No. 11/2 Duplex Deep Hole Drilling Machine



Morel Model No. 41/2 Single Spindle Deep Hole Drilling Machine

occurs in the pressure of the cutting lubricant system. Separate motor-driven pumps are provided for supplying coolant to the drilling tools, each pump being protected by suitable filters.

The Morey Model No. 11/2 Duplex Deep Hole Drilling Machine is started and stopped by means of push buttons mounted on the back of the machine where they are readily accessible to the

"ABRASAW" Wet Cut-Off Machine

PRODUCES a smoother cut.

PRODUCES a greater number of cuts per disc.

REDUCES OR ELIMINATES burring. ELIMINATES burning and surface hard-

ening in most cases.

Capacity: No. 48-W-Solids up to 21/2". Tubing and light sections up to 31/2" diameter. Disc Sizes: Up to 16" diameter, 1/16" to 1/8" thick, 1" arbor hole.

> Also 47-W-Handles Solids up to 1" and tubings and light sections up to 2"



BRIDGEPORT SAFETY EMERY WHEEL CO., INC. BRIDGEPORT, CONN.

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RESINOID BONDED

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can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-blade tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding.

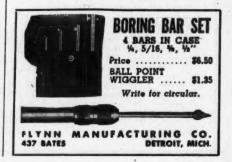
J. K. SMIT & SONS, INC. 157 Chambers St. New York, N. Y. 6400 Tireman Ave. Detroit, Mich. operator and fully protected from cutting lubricant and chips. Also shown herewith is the Morey Model No. 4½ Single Spindle Deep Hole Drilling, a mechanically actuated unit for boring 90 mm. anti-aircraft guns.

Gatco Duplex Spline and Keyway Mill

As a result of the greatly increased demand for doubled keyed parts in the construction of machines, the Giern & Anholtt Tool Co., 1312 Mt. Elliott Ave., Detroit, Mich., has developed the Gatco Duplex Spline and Keyway Mill illustrated herewith which is designed to mill keyways on very long pieces in one setting. The machine is provided with two mill heads which are located directly opposite each other and are advanced by ratchet feed toward one another simultaneously at rates up to 0.020 inch per stroke. An automatic cut-out which can be set for the design of the machine.

The Gatco Duplex Spline and Keyway Mill is equipped with two tables, a table for feeding work and a table which is adjustable for properly locating work for machining. The latter table is locked firmly in place after setting by means of bolts. The feed table, which has a maximum travel of 12 inches, is hydraulically operated through a constant flow vane-type pump system. Both tables are constructed of gray iron. Work to be machined is located between centers and clamped in fixture or by any convenient method desired.

The Gatco Duplex Spline and Keyway Mill is provided with spindle speeds ranging from 230 to 600 r.p.m. for handling cutters from 1 to 1 inch in diameter. The machine is available in two models having maximum capacities for



216



@ Everywhere SKILDRILLS are boost; ing War Production by boosting drilling output on every job! In aircraft plants oktIDRILLS speed up "skin-drilling" ... on tank and engine assembly lines they "shoot holes" in drilling bottlenecks ... throughout holes, SKILDRILLS are light, compact, power time. SKILDRILLS are light, compact, power through tough metals faster ... give you more through tough metals faster ... give you more drilling power and speed for every ounce of weight!

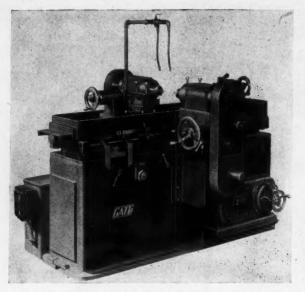
The features that make SKILDRILLS so

weight!
The features that make SKILL/RILLS 30
superior are typical of the full line of SKILSAW
DRILLS . . . a size and type for every job from
fastest production drilling to heaviest
fastest production dril

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work up to 10 inches in diameter x 50 inches long and up to 10 inches in diamGatco Duplex Spline and Keyway Mill

eter x 96 inches long. The 10 x 50-inch model is 10 feet long overall, requires a floor space of 4 x 16 feet, and weighs approximately 5,000 pounds.

Matthews No. 301 **Printing Machine**

Designated as the No. 301, a printing machine for use in printing color bands, insignia, and other important data on the cylindrical bodies of grenades, signal flares, cartridge cases, and so on, has been placed on the market by Jas. H. Matthews & Co., 3944 Forbes

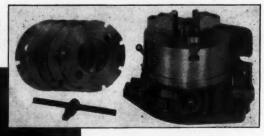
St., Pittsburgh, Pa. The machine can be designed for printing one or more colors.

THE VERSATILE "SUPERSPACER"

The HARTFORD "SUPERSPACER" can easily be set up for one piece or

thousands.

At right: an unconventional but simple and logical set-up for planing the graduation lines on cast iron drums...in a fraction of the time formerly required by milling.



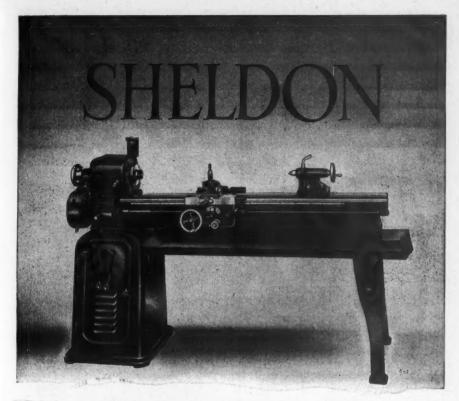
Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12 and 24.

Write for folder.

THE HARTFORD SPECIAL MACHINERY CO.

HARTFORD

CONNECTICUT



Sheldon BBU-1240 WQ Precision Lathe

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate through a standard 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC., 4250 N. Knox Ave., Chicago, U. S. A.

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Automatic Cross-Feed JACOBS Precision Lathe Control



STEP UP WAR PRODUCTION WITH THIS LATHE CONTROL

Installing a Jacobs Cross-Feed Control on your production lathes will greatly increase their output and accuracy. The most accurate, fast and simple cross-feed control ever developed for engine lathes. It will pay for itself in a short time through faster work, less rejects and permit close tolerance production by less experienced operators.

Don't delay. Write for complete descriptive literature.

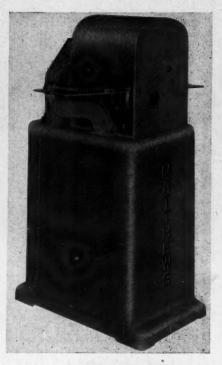
The Jacobs Wind Electric Co.

Industrial Division

MINNEAPOLIS, MINN.

The unit illustrated is constructed to print 20 mm. cartridge cases in one color.

The design of the Matthews No. 301 Printing Machine includes an input gravity feed chute into which the parts to be printed are placed by hand, the parts then rolling by gravity to the printing unit. The printing unit consists of a printing plate cylinder into which interchangeable synthetic rubber type is placed; ink pan, roll, and doctor which



Matthews No. 301 Printing Machine

places ink on the face of the printing plate; and cradle rolls which hold the part to be printed. The cradle rolls are multiple stage and are set into a shaft. The part to be marked is picked up by one cradle rolling and advanced to the printing stage, where it is printed. The cradle then moves forward and automatically deposits the printed part on a gravity takeaway chute which permits the part to roll onto a table or conveyor.

The Matthews No. 301 Printing Ma-



PUTNAM END MILLS FOR FINISH MILLING

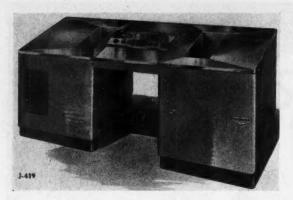
END MILLS AVAILABLE FROM STOCK

Some sizes and types of Putnam End Mills can be supplied immediately from stock. Your Putnam sales representative can tell you what are now available. Exceptional finish from the milling operation alone can be obtained by using Putnam Hi-Speed End Mills. These tools are of a design and quality that make them aspecially adaptable to operations involving high spindle speeds, precision movements, rotary head motion, or other difficult conditions. No matter what kind of a milling job you have, a Putnam Hi-Speed End Mill is always "the tool for the job."



PUTNAM TOOL COMPANY

2981 Charlevoix Avenue . Detroit, Michigan



Kold-Hold Model No. HC 805 Dual-Temperature Machine

in marking from 3,000 to 4,000 parts per hour.

The machine is 34 x 30 x 54 inches in size and occupies a floor space of 18 x 30 inches. Weight, approximately 600 pounds.

chine is powered by means of a ¼ h.p. geared head motor with three-speed cone pulley belt drive to printing cylinder shaft. The machine uses liquid inks, either dye or pigment colors. Inks are quick drying so that parts can be handled within a period of 30 seconds or so after printing. Production depends entirely on the operator's ability to keep the feed chute relatively full. A good operator is said to have little difficulty

Kold-Hold Model No. HC 805 Dual-Temperature Machine

The Kold-Hold Model No. HC 805 Dual-Temperature Machine shown herewith, product of the Kold-Hold Mfg. Co., Lansing, Mich., is designed for use in the rapid-aging of heat-treated parts, rapid cooling and heating of metal parts in shrink fits, temperature processing of sub-assemblies, and production calibra-



Automatic Geed Riveting for AIRCRAFT PRODUCTION!

Designed to handle exclusively aircraft (aluminum alloy riveting) production...this new Air Powered RIVITOR averages 1600 riveted joints per hour...with no manual rivet handling. Combines Air Squeeze action with automatic feeding and setting. Soundly engineered...ruggedly built ...meets today's needs for speed, accuracy and cost-cutting efficiency! Write for new catalog RP-1.



FOR TOUGH JOBS... SPECIFY TJ
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RIVITORS ... AIR AND HYDRAULIC CYLINDERS ... CUTTERS ... CLINCHORS



Better Performance in HYDRAULIC POWER MOVEMENT!

Get maximum power output and efficiency in hydraulic cylinders... by specifying T-J! Easily and quickly installed. T-J Hydraulic Cylinders avoid excessive pressure losses due to friction ... their advanced design assures that initial high mechanical efficiency is continuously maintained. Available in types and sizes to exert power movement from 1000 to 50,000 lbs. (direct). Write for Bulletin H-40. The Tomkins-Johnson Co., Jackson, Michigan.

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tion of thermometers and other instruments. Built in a handy "knee-hole" design, the machine includes a convenient work table between the hot and cold compartments. Thermometers and switches are mounted in a central panel board for maximum accessibility.

The Kold-Hold Model No. HC 805 Dual-Temperature Machine has a capacity for cooling 41 lb. of steel from + 70 deg. F. to — 40 deg. F. in approximately one hour. (Special two-stage units which provide the same temperature change in the same length of time but for 140 lb. of steel are also available.) Tempera-

tures as low as -60 deg. F. are readily obtainable with proportionately lower loads. The Model No. HC 805 has a capacity for heating 275 lb. of steel from +70 deg. F. to +200 deg. F. in approximately one hour.

The Kold-Hold Model No. HC 806 Dual-Temperature Machine is entirely self-contained. The liquid heating and cooling tanks are identical in size. A quick-acting Kold-Hold Serpentine plate liner serves to refrigerate one tank while an immersion heating element serves to heat the other tank. Agitators of the direct motor driven type are provided at the bottom of both baths to keep them at uniform temperatures. Agitator blades are protected by metal guards. Oleum spirits, compass oil, or other types of processing liquids can be used for the baths. Temperatures of the baths are said to be controllable to within plus or minus 1 deg. Fahrenheit.

Specifications of the Kold-Hold Model No. HC 805 Dual-Temperature Machine are as follows: overall height, 36 inches; overall width, 48 inches; overall length, 98 inches; width of knee-hole space, 28 inches; tank dimensions, 30 x 12 x 12 inches; length of work table between tanks, 28 inches.





THE TAYLOR MACHINE CO. 1917 EAST 61st ST. CLEVELAND OHI

TAYLOR - MADE"





WELLS METAL CUTTING BAND SAWS are engineered and designed for dependable long service in metal cutting efficiency, meeting the exacting requirements of present day demands on industry

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METAL CUTTING

BANDSAWS

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By Threadwell's Personal Attention!

The "villain" of today's thrilling drama of war production is Herr Bottleneck, superstooge for Hitler, arch-fiend of subtle sabotage.

Tage.

To "foil" this villain, Threadwell has time and again risen to heroic heights. First, by making taps that have broken performance records in many plants. And second, by working with Threadwell distributors to give personal attention to each order and inquiry. Thus Herr-Bottleneck the Villain has been thwarted, orders have been expedited, and the curtain has come down in the middle of Hitler's neck.

THREADWELL TAP AND DIE CO. Greenfield, Mass., U.S.A.

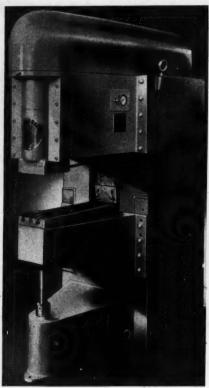


Export Stocking Distributors CANADA: BRIDGE MACHINERY CO., MONTREAL ENGLAND: SKYLUX LTD., LONDON



Progressive Standard Press Welders

Maximum simplicity of operation and unusual flexibility as to application are outstanding features of a complete line of press or projection-type resistance welders announced by the Progressive Welder Co., 3050 E. Outer Drive, Detroit,



Progressive Light Duty Standard Press Welder

Mich. The line comprises four basic types—light, medium, heavy, and extraheavy duty types—each of which is available in from four to six kva capacities and a variety of throat depths.

pacities and a variety of throat depths. Each model is available in either an air-operated or motor-driven style, while extra-heavy models can also be obtained with hydraulic operation. All models are fitted with universal T-slot platens for ready mounting of fixtures and dies.

May

SIMPLE INSTALLATION)



MODEL 11020-A Internal Discharge Type.

INTERNAL DISCHARGE THROUGH CENTER OF INTAKE ELIMINATES OUTSIDE PIPING.

GUSHER COOLANT PUMPS

Because they are simple in design Gusher Coolant Pumps are trouble-free ... efficient ... dependable.

They offer you exclusive and patented advantages. Suited for today's high speed production. From 1/30 to 2 H.P. There's a Gusher to meet your needs in our line of immersed, pipe-connected, flange-mounted, plain drive and tank unit types of coolant pumps.

Specify Gusher. Write for data.

THE RUTHMAN MACHINERY CO.

1817 READING ROAD

CINCINNATI, OHIO

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

Knees of the machines are vertically adjustable to permit setting for various throat openings desired for different jobs. All models are also equipped with double cooling water manifolds located in the bases. These manifolds are pro-vided with a series of outlets to allow for connection of up to six die-cooling circuits to suit individual requirements. Platens are also water cooled.

For motor operation, power is supplied by a standard constant speed induction motor through a combination of variable speed drive, reduction gearing, and clutch, the latter being enclosed in gearbox. To permit mechanical timing where simple welding operations are involved, fan-type timing cams are mounted on the output shaft (slow-speed) of the gearbox. Pressure at the work may be regulated to suit the individual welding job by simply changing the pressure in the air cylinder to which head operation toggle links are direct connected.

For air operation, Progressive Standard Press Welders are equipped with double-acting cylinders mounted in the heads. To cushion against shock and check ram speed as ram nears the bottom or top of its stroke, speed control valves are located in both ends of the

actuating cylinder.

Progressive Press Welders are of unit construction, employing a combination of castings and reinforced and braced welded plates for maximum rigidity. Heavy duty type transformers with water-cooled secondaries, shell-type cores, and pancake coils are provided. Welding heads have long box-type gibs with full adjustment for wear. All surfaces are lubricated to ensure long life and maintenance of alignment.

The press welders are standardly designed for operation on 220, 440, or 550 volts, 50/60 cycle supply. Special models for operation on other frequencies

can also be obtained.



Equip your drilling department with SHUR-GRIPS and reduce non-productive time—hold all shapes securely—fast and convenient—hardened jaws 5" wide open 5". Send for details.

JOHNSON TOOL CO., INC. Aassasoit Avo., East Providence, R. I., U.S.A.

PRECISION GROUND SEEMEL BENCH PLATES



IT'S A CHALLENGE!

 Here's the Bench Plate to consider where inspection and assembly of small parts is required.

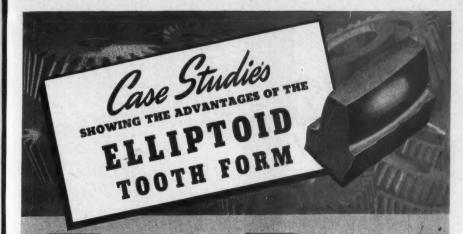
Precision Ground of special semi-steel these wear resistant Bench Plates are designed to provide rigidity and will retain accuracy under constant use.

On the assembly line their smooth, solid working surface helps materially to maintain set production speeds.

Made in 2, 4 and 6-inch thickness. Sizes up to 36x96-inches are available either precision ground or planer finished. Larger sizes planer finish only.

THE CHALLENGE MACHINERY COMPANY





NO. 1

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> Passenger car gear box equipped with conventional gears weighed 150 pounds for a torque of 300 foot pounds. Using the ELLIPTOID tooth form, this unit was reduced in weight to 76 pounds for the same torque capacity.

A truck manufacturer who changed his conventional transmission gearing to ELLIPTOID gearing discovered he had added 300 per cent to the service life of

NO. 3

his product.

Red Ring Shaving machine develops the Elliptoid tooth three times the service life. while shaving and at no extra

any given rating.



SPECIALISTS ON SPUR AND HERCAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

NO. 2

In changing from conventional to ELLIP-TOID tooth form, the torque capacity of a truck transmission was increased 200 per cent without adding a pound to its weight.

Gear tooth shaving in the ELLIPTOID

form has made it possible for a speed reducer manufacturer to materially reduce

both the cost and size of his product for

NO. 5

NO. 4

Another manufacturer of heavy equipment, having difficulty with tooth break-age, substituted the ELLIPTOID tooth form for the conventional form. Result-

NATIONAL BROACH RED RING PRODUCTS

5600 ST. JEAN DETROIT MICH.

3



WHEELOCK, LOVEJOY & CO., INC.

minute information.

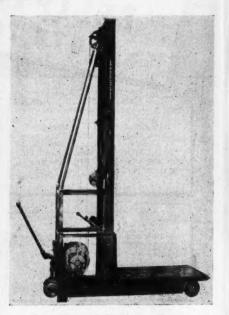
CAMBRIDGE . CLEVELAND

CHICAGO . NEWARK

DETROIT . BUFFALO

Lewis-Shepard Air Power Stacker

Known as the Lewis-Shepard Air Power Stacker, a portable elevator especially designed for use in explosive atmosphere is now being featured by the Lewis-Shepard Sales Corp., 600 Walnut St., Watertown, Mass. Powered by a rugged air motor, the unit is said to operate efficiently at the same pressure and volume as industrial overhead air hoists.



Lewis-Shepard Air Power Stacker

Precise control of the stacker platform is at the operator's finger tips so that any speed of lifting or lowering between maximum top speed and zero is instantly obtainable. Upper and lower limit stops automatically operate to prevent all possibility of over-ride when lifting or lowering. A "dead man" cable control running the full height of the stacker stops the air motor and platform the instant the operator removes his hand from either one of the dual hold-over controls.

The Lewis-Shepard Air Power Stacker is available in hinged and telescopic types having the same speeds and capacities as the company's standard line

of electric powered stackers.

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ada



EVERY needless minute your costly machines stand idle between jobs means less production for you—and a longer war for all of us.

The photographs here may show you the way to an important saving. For each shows an arrangement that gets tools on the job with no waste of those precious minutes.

No one of these arrangements may fit your shop... but that's not the point. They may suggest a method adaptable to your requirements. In checking your tool storage methods, keep these three fundamentals in mind:

- A place for every tool, with a record to show its disposition when it's out.
- An easily read and systematic means of identification.

3. Ample protection for keen cutting edges.

There are few places in your plant where careful planning will pay you more than your tool crib.





GREENFIELD TAP AND DIE CORPORATION GREENFIELD, MASSACHUSETTS

DETROIT PLANT: \$850 Second Boulevard
WAREHOUSES in New York, Chicago and Los Angeles
In Canada:
FOR THE DETROIT AP AND DEE COMP. OF CANADA, LTD., GALT. OWE.

700l Conservation Begins in the 700l Crib

Reeves Reducer-Type Transmission

Illustrated herewith is the Reeves Reducer-Type Transmission which has been added to the line of variable speed control equipment built by the Reeves Pulley Co., Columbus, Ind. Designed to occupy a minimum of mounting space, the unit consists of a standard Reeves variable speed transmission with built-

in speed reducer.

The Reeves Reducer-Type Transmission is available in two enclosed designs - horizontal and vertical - which may be mounted in any position desired. Each design is available in a wide range of speeds and in capacities from 1 to 7½ h.p. inclusive. The transmission can be obtained in various sizes for producing ratios of speed variation from 2 to 1 through 12 to 1. The reduction gears are designed to provide ratios up to and including 6.9 to 1. Speed changes are effected by turning a handwheel. Completely automatic regulation of speed changes through mechanical or hydraulic means is also available.

The reduction gears are mounted on the variable shaft of the transmission, this shaft serving as the input shaft for the reducer unit. The assembly of the



Reeves Reducer-Type Transmission Equipped with Reeves Adjustable Motor Base which Accommodates any Standard Constant Speed Motor for Individual Drive

reducer unit may be made in many different positions. According to the manufacturer, the gear reduction unit is especially designed to meet the severe torque demands of variable speed service, allowance being made in the size for overload in starting and momentary

GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dresser and Cutter for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

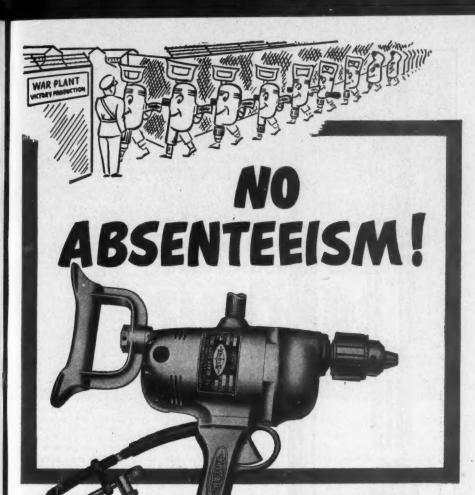
DESMOND SIMPLEX

Steel Slide VISES



A full line of Machinists', Filers, Welders, Production and Drill Press and Milling Machine Vises. Let us send you our vise catalog and name of your nearest dealer.

THE DESMOND-STEPHAN MFG. CO. Urbana. Ohio



They've got"What it takes for long punishing service"

Designed for greater efficiency, lighter weight, increased power, and improved handling.

A Size for Every Need

Heavy Duty $1" - \frac{3}{4}" - \frac{5}{8}" - \frac{1}{2}"(2) - \frac{3}{8}"(2) - \frac{4}{18}" - \frac{1}{4}"$ 1/4" Low Speed Special 1/4" All Angle

Ask your SIOUX Distributor or write for details

STANDARD THE



WORLD OVER

ROGERS EAMERS

SINCE 1885

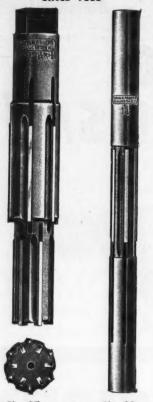


Fig. 37

Fig. 39

Conserve High Speed Steel by using Rogers Inserted Blade adjustable-forwear Reamers.

Align and concentric in diameter down to % inch.

Deliveries Good.

JOHN M. ROGERS TOOL CORP.
GLOUCESTER CITY NEW JERSEY

peak loads. The shafts of the reducer proper are mounted on heavy duty ball radial bearings and are made of high carbon steel. The gears of the reducer are of a helical type which provides for smooth, quiet operation, and all rotating parts of the reducer are splash lubricated. Three oil plugs are provided, one for determining the oil level, one for filling the reducer, and one for draining the oil.

The Reeves Reducer-Type Transmission, in either horizontal or vertical design, may be arranged for individual motor drive through the incorporation of a Reeves motor base. This base is attached to the top of the transmission frame and is universally adjustable to accommodate any standard make of motor of the correct horsepower capacity for any given size of Reeves Reducer-Type Transmission. Connection between motor and constant speed shaft of the unit may be effected either through silent or roller chain and sprockets, multiple V-belts, or pinion and gear.

Northern Low Headroom Hoist

A low headroom hoist for operation on the various types of special section monorail track systems throughout industry is announced by the Northern Engineering Works, 2601 Atwater St., Detroit, Mich. Supported on trolleys especially constructed to fit the monorail track system to which they are applied, the hoist features the well-known Northern Hi-Lift design which provides maximum hook lift, and is built in capacities of from 1 ton up. The unit is available in both cab and floor-controlled types which may be furnished with variable speed push-button control.

Of extremely sturdy construction, the Northern Low Headroom Hoist is pro-

ARTUS ARBOR SPACERS The COLOR tells the THICKNESS



ARTUS Arbor Spacers made of plastic in various celors dentify thickness at a slancel .001, .0015, .002, 003, .005, .0075, .010 - .030. Speed up accurate fitting at low cost. Write for folder. Spacers, Gaskets, Shims IMMEDIATE DELIVERY

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Broadway New York, N. Y.

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High-speed steel teeth ... with a wedge for every tooth ... mean extra strength and sharply improved operating characteristics that in many cases have doubled metal-cutting production on billets, sheets, rods and rails. Alternating bevelled and square teeth split chips in 3

parts, and curved gullets clear them easily under heaviest loading. So chips can't weld, stick, or cause the saw to break Teeth are readily sharpened in the plate . . and quickly replaced, when worn out, by your own mechanics. Prompt shipments on rated orders.

Operating Handbook FREE

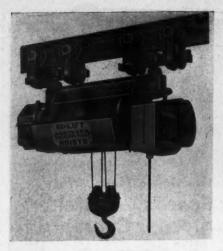
Handy pocket book tells how to get utmost service and production from Simonds Inserted Tooth Saws.

SIMONDS SAW AND STEEL CO.

1350 Columbia Road, Boston; 228 First St., San Francisco; 520 First Ave., So., Seattle; 127 So. Green St., Chicago; 311 S. W. First Ave., Portland, Ore.

SIMONDS Famous Family of Metal-Cutting Tools

BOUGHT YOUR BONDS THIS WEEK? *



Northern Low Headroom Hoist

vided with a specially welded rolled steel plate frame and is equipped with machine-cut gearing which is hardened so as to eliminate wear. The design of the unit also includes heavy duty roller bearings and splash lubrication arrangement. The mechanical load brake of the hoist is readily accessible for quickly replacing worn friction surfaces.

Perfex Angle-To-Tangent Radius Dresser

Perfex Gage & Tool Co., 3607 Gaylord, Detroit, Mich., is now offering the Perfex Angle-To-Tangent Radius Dresser shown in the accompanying illustration. The horizontal-type construction of the unit permits it to be used to dress a wheel at the bottom where grinding operations actually take place and where wheel dressings can be readily thrown away from the dresser into the dust collector of the grinding machine.

Another feature of the Perfex Angle-To-Tangent Dresser is the manner in which the diamond point is automatically set on center. This is accomplished by the exclusive diamond mount construction and the way in which the shank of the diamond tool is ground. As shown in the illustration, a 90-deg. vee is ground in the diamond mount

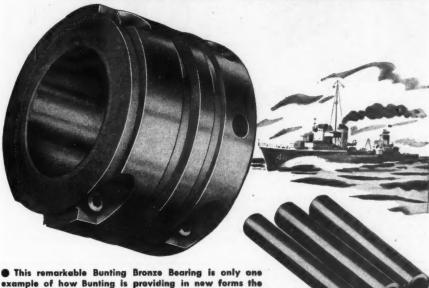


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TODAY AND TOMORROW

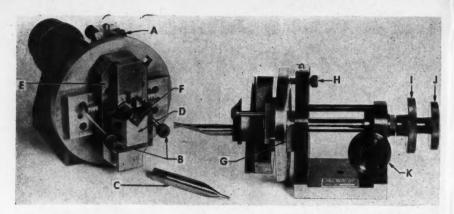


● This remarkable Bunting Bronze Bearing is only one example of how Bunting is providing in new forms the traditional strength, staying quality and shock resistance of sand-cast Bearing Bronze. This Bunting Bearing is found in the intricate machinery of American battleships, cruisers and destroyers.

Saving money, time and labor in the battle for production in thousands of busy plants are Bunting Factory-Finished Bearing Bronze Bars and Bunting Standardized Bronze Bearings. Available in many different sizes from

stock, these completely finished bearings are ready for assembly in machine tools, electric motors and industrial machinery of all kinds. Ask your wholesaler...Write for catalog. The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.





Perfex Angle-To-Tangent Radius Dresser. A—Vernier. B—Stop Pins. C—Dressing Diamond. D—Radius Adjustment. E—Tangent Slide. F—Dressing Tool Mounting. G—Stop Dog for Controlling Angle. H—Stop Pin. I—Handwheel for Dressing Radius. J—Handwheel for Dressing Angle Tangent to Radius. K—Lock.

block of the dresser and two flats are ground on the diamond tool shank. Thus, when the diamond shank is placed in position in the 90-deg. vee of the mount block, it automatically locates the diamond point on perfect center.

The design of the Perfex Angle-To-Tangent Radius Dresser also permits it to be used to dress a 0.050-inch radius to a full half circle without the pur-

High Precision Spur and Helical **GEARS**

Interchange — Quiet

We machine your blanks or cut from bar stock. We cut and grind gears on Mang Machines in our Jersey City Plant to an Accuracy of Profile up to .00012"; of Pitch up to .00024" and concentricity of Pitch Circle, within .0060". Gears cut to usual standards without grinding. (We do not make worm or bevel gears.)



SWISS-AMERICAN GEAR MFG. CO.

5001 CHRYSLER BLDG.

NEW YORK, N. Y.



This is new. And it's NEWS for every post-war planner. World's largest fractionating tower. It's all-welded. Sets a NEW high in fit-up tolerances and fractionating efficiency—a NEW low in oil refining cost.

ALTER EGO: Yes—and a NEW high in construction savings. Tower shell costs 30.7% less, weighs 15% less. Trays cost 30% less, weigh 54% less—because of arc welded construction.

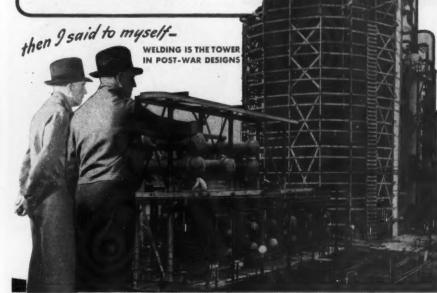
That's the post-war pattern! The NEW product must be a better product at less cost. Be it vacuum tower or vacuum cleaner the NEW product must obsolete the old models. Otherwise it's a sales dud.

ALTER EGO: Right! To build metal products that will win post-war sales we've got to think about how WELDING is now building the ADVANCED fighting equipment for winning the war.

That IS something to start this post-war thought: Since we will have to fight WITH or AGAINST new models, let's plan the NEW by finding out from Lincoln what's NEW in arc welding—and how to apply it,

Ask your inner self whether eld models will SELL after the war.

THE LINCOLN ELECTRIC COMPANY



WHERE A SLIP MEANS A REJECT....



USE PARKER VISES!

Too often, when work slips in a vise it means a reject... valuable time wasted, critical materials spoiled. Play safe... use Parker Vises!

Parkers grip work evenly, firmly, with accurately controlled pressure. They're precision-built...respond to the slightest turn of the handle . . . have no slack to take up when gripping or releasing. The Charles Parker Company, Meriden, Conn., U. S. A.

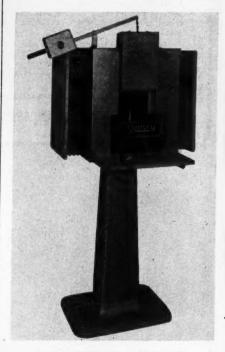
Handled by Leading Distributors

PARKER VISES
AMERICA'S OLDEST

chase of additional equipment. By using a gage block setup, a direct reading from the base to the diamond can be obtained, thus ensuring an accurate radius. The construction of the dresser also permits the use of a sine bar to ensure accuracy of angles. All moving parts of the unit are made from unusually hard steel and are ground and lapped to perfect fits, with all surfaces protected from rust.

Sentry Improved Size No. 2 Model "Y" High Speed Steel Hardening Furnace

Improvements in the design of its Size No. 2 Model "Y" high speed steel hard-



Sentry Improved Size No. 2 Model "Y" High Speed Steel Hardening Furnace

ening furnace are announced by The Sentry Co., Foxboro, Mass. For the operator's convenience, an asbestos loading shelf of ample width and depth to Slash Hours off Your SET-UP TIME

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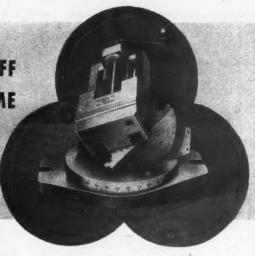
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ANGLE DRILLING



With WESSON Universal Vises, difficult precision set-ups and tool-ups for compound angle machining can be completed in minutes instead of hours! If you need to move the job from one machine to another, it can be done without releasing the piece or disturbing the angle. The precision of toolroom procedure can be maintained at high production speeds. And because they are compact . . . lower in height

than any other vise . . . Wesson Universal Vises work in closest quarters.

TWO SIZES . . . Quality at comparatively Low Cost!

Slotted surface plate attachment available for use as Universal Angle Plate.

CONTROL VISES

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BUILT TO WESSON PRECISION

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AVAILABLE NOW

Immediate Deliveries

WESSON CO.

DETROIT, MICHIGAN (Ferndale Station) WESSON CO., Detroit (Ferndale Station), Mich.

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

Name and Title

Firm Name

Address

City

State

permit easy arrangement of several furnace loads has been added on the front of the furnace. From the safety point of view, new metal guards have been provided on the unit to prevent the possibility of accidental contact with live power supply. Throughout, the furnace has been redesigned for added strength and durability.

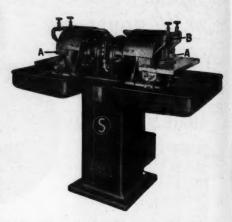
Standard Carbide Tool Grinder with Wet Grinding Attachment

The carbide tool grinder with wet grinding attachment shown in the accompanying illustration is now being offered by The Standard Electrical Tool Co., Dept. B-17, 2488 River Rd., Cincinnati, Ohio. The machine is powered by means of a 3 h.p., 1,150 r.p.m. motor which is operated by a magnetic reversing starter and separate three-button push-button station. The spindle of the machine is equipped with a heavy steel backing plate at each end for accommodating a mechanically mounted 14-inch diameter cup type grinding wheel.

diameter cup type grinding wheel.

The work tables of the grinder incorporate rigid mounting means, are gradu-

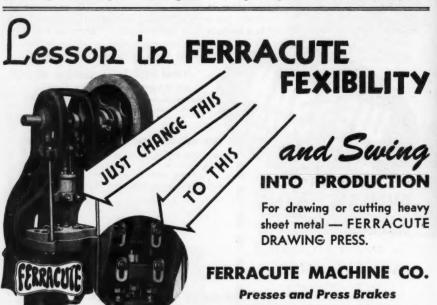
ated, and can be adjusted 5 deg. toward and 30 deg. away from the wheels. Each wheel is protected by a specially con-



Standard Carbide Tool Grinder with Wet Grinding Attachment

structed guard having an adjustable shoe or splash guard (A) which is adjusted

Bridgeton, N. J., U. S. A.



May.

RECOMMENDED **PROCEDURE**

- 1. MACHINE END FACE
- 2. DRILL HOLE
- 3. BROACH HOLE
- 4. FINISH END FACE AND CONTOUR LOCATING FROM BROACHED HOLE



COMMON **PROCEDURE**

- 1. MACHINE END FACE
- 2. DRILL HOLE
- 3. MACHINE CONTOUR LOCATING FROM DRILLED HOLE
- 4. BROACH HOLE

How to get more accuracy by Broaching ----

5. BY PROPER MACHINING SEQUENCE.

HE drawing used at the left illustrates a broaching principle.

To get the most out of broaching-don't expect a broach to correct eccentricities or lack of squareness created by previous machining sequence. Broach your holes and surfaces FIRST and then use these surfaces to locate from.

This is one of the "Do's and Don't's on Broaching" available in printed form in bulletin board size. Write for a copy today. Ask for Bulletin No. 274.

CO DIA BROACH COMPANY



Broaching Machines Broaches-Broaching Equipment DETROIT.... U. S. A.



Slipping HAZARDS

And Accident Lay-Offs with MORTON STEEL SAFETY TREADS

Wherever workers stand or walk on oily, wet of slippery surfaces—around machines, on stairs, platforms, loading ramps, ladders or catwalks—slipping accidents are almost inevitable. In all such places you can assure safe footing with Morton Steel Safety Treads.

They "grip men's soles" This permanent gripping action is provided by upset buttons, die formed and perforated. Edges of holes do not wear smooth and will not retain oil, water or other liquids. (Furnished with buttons unperforated, if desired.)

MORTON SAFETY STAIR

TREADS The inexpensive way to restore worn stair treads Simply apply Morton Steel Safety Treads on worn treads. The flange nosing stiffens the tread at the outer edge, and its anti-slip properties are permanent.



HEAVY MACHINERY MANUFACTURERS Design Morton Steel Safety Tread ladders, stairs, platforms and catwalks into your machines. Inexpensive, lightweight, easy application.

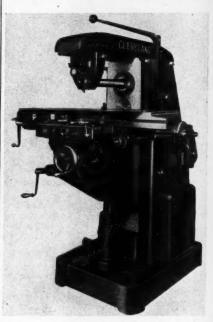


by means of a conveniently located hand screw (B).

The design of the machine allows for the performance of either dry or wet grinding operations, the wet grinding attachment being powered by an individual motor drive and controlled by a separate toggle switch. The grinder is also available in 1 and 2 h.p. sizes with 10 and 12-inch grinding wheels respectively.

Cleveland No. 11/2 Horizontal Production Milling Machine

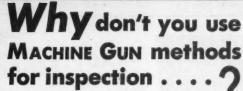
Designated as the Cleveland No. 1½, a horizontal production milling machine which can be easily set up for perform-



Cleveland No. 11/2 Horizontal Production Milling Machine

ing both long and short run milling operations has been brought out by The Sommer & Adams Co., 18511 Euclid Ave., Cleveland, Ohio. The machine is driven through V-belts connected to a constant-speed shaft. The motor for operating V-belts is fully enclosed in the







One-at-a-time inspection of dimensions is only single-shot rifle shooting. The men at the fighting front use faster methods, but how about you on the home front?

These gages show how nine and ten dimensions can be inspected in a fraction of the former time — more positively — and more accurately. Investigate this fast, accurate and low cost method of inspection. Write to:

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PROVIDENCE RHODE ISLAND

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PRECISION MEASURING INSTRUMENTS

Chicago · Cleveland · Detroit · Hartford · Los Angeles · Milwauke · Montreal · Indianapolis New York · Philadelphia · Pittsburgh · Röchester · San Francisco · St. Louis · Toledo · Toronto · Windson base of the column of the machine.

The spindle, which is made of chromenickel steel, is provided with a National Standard No. 40 taper and is mounted in preloaded Timken roller bearings. Eight spindle speeds ranging from 50 through 1,000 r.p.m. are readily obtained through pick-off gears and back gear. An automatic spindle brake is included among the standard equipment of the machine.

The table of the Cleveland No. 1½ Miller is provided with 15 standard feeds ranging from ½ through 18 inches per minute, which are obtained through easily accessible pick-off gears. The table

can be arranged with fully automatic operating cycle in both directions or in one direction only. The lead screws of both table and saddle are mounted on Timken bearings to permit free movement.

The Cleveland No. 1½ Horizontal Production Milling Machine features an unusually rigid one-piece column having a wide knee bearing surface. Other features include a self-oiling outboard support and enclosed electric panel. All gears of the machine are heat treated and shaved.

Specifications of the Cleveland No. 1½ Miller are as follows: working surface of table, 10½ x 42 inches; number of T-slots in table, 3; width of T-slots, 1½ inch; distance between T-slots, 2½ inches; longitudinal travel of table (power), 24 inches; cross travel of table (hand only), 4 inches with outer support; 8 inches without outer support; vertical travel of table (hand only), 12 inches; maximum distance from center line of spindle to table, 12 inches; minimum from center line of spindle to table, 0; distance from center line of spindle to underside of overarm, 6 inches; number of spindle speeds, 8—50, 130, 175, 250, 360, 520, 700, 1,000 r.p.m.; number of table feeds, 15—½, ¾, 1, 1¼, 1½, 2, 2½, 3, 4.

GEARS GOOD GEARS ONLY

All Kinds—Any Quantity
AT THE RIGHT PRICE
HE CINCINNATI GEAR CO

THE CINCINNATI GEAR CO.





Eastern Sales Office: 225 Lafayette St., New York ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"

5700 BLOOMINGDALE AVE.

CHICAGO, U. S. A.

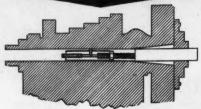
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Here is an amazing new attachment which greatly simplifies lathe operation, especially in mass production work. Easily attached in few seconds. Inexpensive. Sizes to fit lathes of all types and makes.

- Increases and Speeds Production
- · Reduces Rejects
- Saves Set-Up Time
- · Assures Uniform Accuracy
- Requires Only Semi-Skilled Operator

MODEL No. 101—Fits all bench-type lathes including South Bend, Logan, Atlas, Sheldon and other 595

ORDER TODAY! Please give type of lathe and inside diameter of lathe spindle.

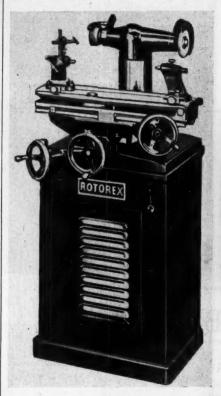
SCHULTZ & ANDERSON CO.
109 EDISON PLACE NEWARK N. J.

Manufactured by
GREENFIELD MACHINE AND TOOL WORKS

6, 8, 9½, 12, 14½, 18 inches per minute; power rapid traverse to table, 80 inches per minute; drive, enclosed V-belt; motor recommended, 3 h.p. 1,800 r.p.m.; floor space, 58 x 79 inches; weight, 3,250 pounds.

Rotorex No. 1 Universal Tool and Cutter Grinder

The accompanying illustration shows the Rotorex No. 1 Universal Tool and Cutter Grinder which is now being mar-



Rotorex No. 1 Universal Tool and Cutter Grinder

keted by the Douglas Machinery Co., Inc., 150 Broadway, New York, N. Y. The base of the machine consists of a totally-enclosed cabinet-type box section which is designed to provide maximum Rive

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INCREASE
PRODUCTION IN
RIVETING and
UPSETTING?

HANNA DUPLEX ELECTRIC HYDRAULIC RIVETER with a capacity of forty tons pressure

Hanna Hydraulic RIVETING PRESS

BUILT for action that gets things done, Hanna Riveting Presses will drive from one to six —or more if wanted—rivets in a single stroke. Rivet die advances rapidly at low pressure until contact — then pressure increases as the rivet is driven, giving a positive set. Die reversal occurs the instant the rivet is driven

—rapidly. It's all automatic with uniform results.

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strength and rigidity with a minimum of weight. This base serves as a sup-port for the well proportioned saddle and table of the machine.

The cross slide on which the table is mounted is well proportioned to prevent distortion or bending and to assure accurate grinding of workpieces. The table is equipped with an adjustable friction drag and locking device so as to ensure proper longitudinal movement for all workpieces and to eliminate any idle movement. The surface of the table is provided with a T-slot for aligning and fastening headstock, footstocks, and

other attachments.

The top of the table is designed for swiveling up to 90 deg. either side of center. Markings are provided at the right end of the table to facilitate setting for grinding tapers. These markings indicate the taper in inches per foot. For tapers in excess of these markings, the graduations at the center of the table around the swivel point, which indicate the taper or angular movement in degrees, can be used. A handwheel, conveniently located at the front of the machine, is used for moving the table crosswise. The handwheel is graduated in thousandths of an inch to allow for accurate setting.

The spindle head of the machine is mounted on a rugged, reinforced, cast iron column, which is held by the upper heavily ribbed cast iron part of the base. A handwheel, conveniently located at the front of the machine, provides for an 8-inch vertical movement of the column and spindle head, and is graduated in thousandths of an inch for accurate adjustment. The spindle head is equipped with a 1¼-inch diameter grinding spindle which is dynamically balanced and mounted on precision ball bearings with labyrinth seals to ensure long life and freedom from grinding dust. A 105-

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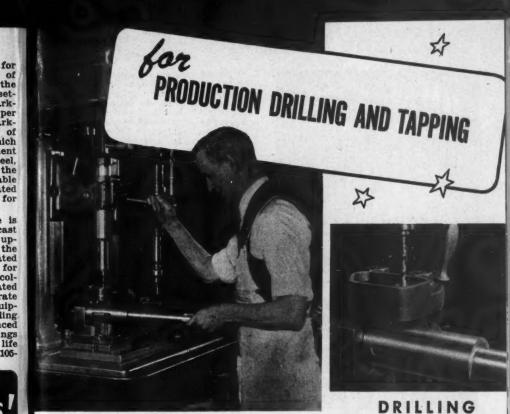
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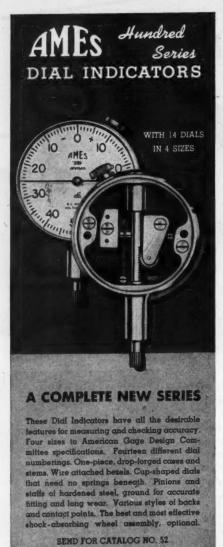
Detroit Office: General Motors Building



TAPPING

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FOOTBURT Sensitive DRILLING MACHINES



deg. swivel movement of the spindle head in either direction is provided.

The spindle is driven by a ½ h.p. balanced motor which is bolted onto an adjustable bracket located on the vertical column in the base of the machine. Thus, perfect alignment between grinding spindle pulley and motor is said to be maintained at all times. Power is transmitted by a V-belt. The spindle is provided with infinitely variable speeds ranging from 3,000 to 6,000 r.p.m., thus enabling grinding wheels of practically any desired size to be efficiently used on the machine. Speed changes are quickly effected through a conveniently located handwheel on the motor base.

The tooth rests, included as standard equipment of the machine, are designed so that tool grinding setups can be quickly and accurately made. The rests, which are rigidly constructed, can be easily mounted on different parts of the machine. A micrometer device, graduated in thousandths of an inch, provides for quick and accurate setting of tooth rests.

The Rotorex No. 1 Universal Tool and Cutter Grinder is standardly available as a dry grinding unit, however, it can also be supplied equipped for wet grinding if desired. General specifications of the machine are as follows: swing over table, 8 inches; distance between centers, 15 inches; distance between tailstock and work head, 12 inches; table surface, 3½ x 26 inches; longitudinal movement of table, 14 inches; cross movement of table, 5 inches; vertical movement of grinding wheel spindle, 8 inches; swivel movement of grinding wheel spindle, 210 deg.; maximum distance center line of spindle to top of table, 10 inches; distance center line of workpiece from floor, 44½ inches; dimensions overall, 26 inches wide x 28 inches deep x 56 inches high; approximate shipping weight, including motor, 655 pounds.



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• To help meet greatly increased wartime demands on the accuracy and life of precision gage blocks Webber Gage Co, announces that effective immediately every 81A set of Webber Gages will contain three new blocks which will double the measuring range and greatly prolong the life of the set. One of these is a new block permitting measurements of one half of one ten thousandths of an inch. The other two blocks are 'wear blocks. (.100 inch) Normally all measurements with gage blocks are made in steps of .0001". With the addition of this new block, .10005", you can now make measurements in steps of one half of one ten thousandths of an inch.

Previously about 125,000 size combinations were possible with an 81A Set of Webber Gage Blocks. This new .10005 inch block doubles this range permitting about 250,000 size combinations.

The two new .100 inch "wear" blocks have been

The two new .100 inch "wear" blocks have been added to save unnecessary wear to the rest of the

blocks in the set. An example of the use of "wear" blocks is shown in the illustration at right of setting an adjustable snap gage. Here the blocks are all wrung together and the master blocks being in the middle are protected by the "wear" blocks on which you always expose the same surface to the work. The wear is always on the wear blocks preserving your master blocks, assuring continued accuracy. Thus Webber Gage Co. have increased the

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utility of their gage blocks by doubling the range has added greatly to the life of the set with the two "wear" blocks—and the cost of the set is just the same as always. The new set will be known as No. 84A . . . Write for full information.



"wear" blocks is shown in the illustration at right of setting an adjustable snap gage. Here the blocks are all wrung together and the master blocks being in the middle are protected by the "wear" blocks GAGE COMPANY TRISKETT RD., CLEVELAND, OHIO



For the duration Webber's entire productive capacity is being devoted to the manufacture of GRADE A BLOCKS only.

Prompt delivery to firms furnishing necessary priorities. Prices for Set 84A — \$350.00. Set 40A — \$185.00.

Notice: The new 84A sets have been in production and all deliveries made on or after March 6 are of this new set.

Kling Rotary Shear

A rotary shear designed to meet requirements of both speed and accuracy in the shearing of metal sheet and plate is now being produced by the Kling Bros. Engineering Works, 1300 N. Kostner Ave., Chicago, Ill. The machine, which has a maximum capacity for shearing mild steel plate up to 1 inch thick, is available with a variety of attachments for cutting straight lines, openings, circles, odd shapes, strips, flanges, bevels, joggles, and offsets. The machine can also be equipped with rolls for beading, U-ing, wiring, and forming operations.

All high speed shafts of the machine are mounted on anti-friction bearings, while slow speed shafts are provided with large bronze bushings. Cutter shafts are equipped with thrust ball bearings. All gearing at the back of the machine operates in an oil bath with convenient draining arrangements. The balance of the equipment is Alemitelubricated.

A quiet-operating V-belt drive from motor to drive shaft forestalls wear by absorbing shocks resulting from sudden starting under load. A universal coupling of improved design is used to con-



Kling Rotary Shear

nect drive shafts from the rear to the front of the machine. A friction clutch of the Pullmore double-end oil-type provides for changes in shearing speed



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when shifted from one position to another

Cutters are made of oil-hardening tool steel, properly heat treated to ensure maximum service life. A gib key is provided for taking up wear resulting on cutter heads. All bevel gears and pinions, as well as cutter shafts, are made of wear-resistant alloy steel. Rapid setting of cutters in proper shearing relation is effected by means of an adjustment on the lower cutter shaft.

The Kling Rotary Shear is available in six models having maximum shearing capacities ranging from ½ to 1-inch plate, thus adapting it to the needs of all types of plants in which sheet metal or plate is sheared or formed, including boiler factories, shipyards, automobile and aircraft plants, structural shops, sheet metal shops, steel mills, and steel warehouses.

Philips Metalix X-Ray Crystal Ānalysis Āpparatus

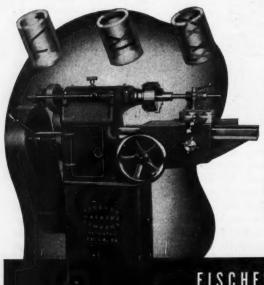
The Philips Metalix Corp., 419 4th Ave., New York, N. Y., has placed on the market the X-ray crystal analysis

apparatus illustrated herewith which can be used for the precise angle measurement of mother quartz, sections, bars, wafers, and blanks. The design



Philips Metalix X-Ray Crystal Analysis Apparatus

of the apparatus provides for a wide choice of analysis methods, depending upon the character of the quartz piece to be measured.



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A wide variety of grooves may be cut on the "FISCHER" . . . with minimum set-up time and cost.

Bearing in which groove is to be cut is mounted on revolving chuck secured on work spindle. Boring tool is secured to carriage slide which has a reciprocating motion timed with work spindle and linked by crank gear and connecting rod.

Several attachments can be furnished for cutting practically any type of oil groove.

Capacity of No. 1 Machine — 5" dia. . . . No. 2 Machine—15" dia.

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With this apparatus, tests, it is claimed, can be made in an unusually short period of time by relatively unskilled operators. The design of the apparatus enables a manufacturer of crystals to predetermine the characteristics of an oscillator by actually maintaining the basic cutting angle. As a result, saw tie-ups are said to be considerably reduced, the improper cutting of material avoided before expensive finishing operations are performed, and in general, re-

jects substantially reduced.

The Philips Metalix X-Ray Crystal Analysis Apparatus is claimed to be completely shockproof and ray-protected. As shown in the illustration, the apparatus includes two working positions. The left-hand position is for natural face orientation and the right-hand position for checking of blanks after the cutting angles have been determined on the natural face orientation table. If desired, the orientation table can be removed and both positions used for the checking of blanks.

The apparatus consists of a Philips Metalix Type No. 37000 X-ray tube with two Lindemann glass windows and horizontal filament for increased output. The rays emitted from the X-ray tube are received in the tube of an ionization tube circuit. This circuit is essentially a measuring device which is used for the detection of X-rays and consists of an ionization tube, amplifier, power source, and indicating meter. Since all that is required is to determine the exact position of the maximum diffracted beam, the indicating meter does not have to be calibrated in order to read energies.

The theory on which the apparatus was designed is that for a particular wave length of X-rays, the angle of reflection is usually determined by the atomic plane which is used to reflect the beam. The best reflecting plane which most nearly coincides with the surface of the crystal is used to check the angle of cut of that crystal. In a perfectly cut crystal, the position of this atomic plane makes a definite angle with the surface of the crystal. Any deviation from that angle indicates that a correction on the cutting angle is necessary.

In practice, the ionization tube is set at the reflection angle for the atomic plane used and the crystal is rotated until the diffracted beam is received in the ionization tube. The angle read on the graduated scale is compared with the angle obtained with a perfectly cut standard crystal and the cutting correction is made accordingly.

MODERN MACHINE SHOP

May, 1943

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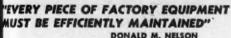
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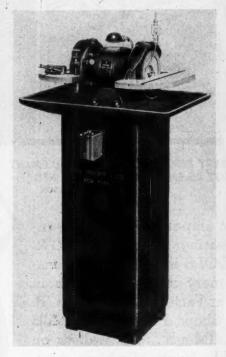
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NEW YORK CITY

Prosser Model AA Floor Type Carbide Tool Grinder

Designated as the Model AA, a floor type carbide tool grinder having a heavy base, drum-type on-off-reverse switch, unusually heavy tables, storage compartment for wheels and tools, and other features is now being introduced by Thomas Prosser & Son, 120 Wall St.,



Prosser Model AA Floor Type Carbide Tool Grinder

New York, N. Y. The design of the machine provides for the rapid removal of metal during roughing operations together with the accurate finishing of all single-point tools to smooth, keen cutting edges, with flat surfaces held exactly to desired angles. Either silicon carbide or diamond wheels for grinding carbide, or aluminum oxide wheels for grinding Stellite or high speed steel can be used on the machine.

In addition to the above mentioned features, the Prosser Model AA Floor Type Carbide Tool Grinder includes sim-

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ple, positive, quick-acting indexing devices which provide for the instant setting of tables to the desired angles. The machine is designed for use with oversize 7-inch wheels, thus affording long wheel life and permitting the grinding of unusually large tools. The location of hubs on shafts is readily adjustable to compensate for wheel wear. Thus, the faces of the wheels can be kept close to the edges of the tables and the wheels used up practically 100 per cent. The spindles of the machine operate in

The spindles of the machine operate in high grade precision ball bearings which are equipped with adequate dust seals and are designed to eliminate all end play. Various attachments can be furnished for the machine, such as a device for grinding carbide or high speed steel drills of various sizes and a simple attachment for the grinding of lips in the surfaces of tools to curl or break chips when turning steel.

Industrial No. 0-9 Vertical Milling Machine

Designated as the No. 0-9, a vertical milling machine which can be used for performing both milling and jig boring operations is announced by Industrial Tool & Die Works, Inc., Minneapolis, Minn. The machine is of fixed bed type construction, with the head and column cast of close grain iron, in one piece, and adequately ribbed to ensure maximum rigidity. The cabinet-type base is made of sufficient height to provide operator with a convenient table working level and is recessed to afford ample leg and foot room, thus enabling operator to sit on a stool when operating the machine.

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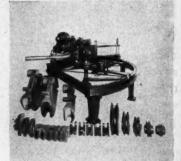
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LEIMAN BROS. Inc. 168-1 Christie St. Newark, N. J. are made of heat-treated alloy steel. All rotating shafts and the spindle of the unit operate on anti-friction bearings, the spindle having two bearings at the bottom and two at the top. The lead screw of the machine is supported at each end by bronze bearings. The machine is lubricated by high pressure

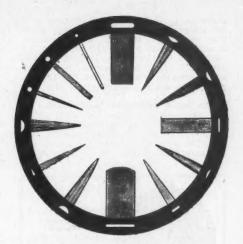


Industrial No. 0-9 Vertical Milling Machine

grease, with the ball bearings in the spindle head being greased and sealed for life.

The spindle is made of chrome-nickel steel and is provided with a No. 7 Brown & Sharpe series taper hole. The spindle is driven by an independent heat-treated alloy steel quill fitted in a vertical head. A 3-inch vertical adjustment of the quill is provided by a hand lever, located at the right side of the machine, which

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When you want advice as to the most suitable Swiss-Pattern Files for your work, consult "American-Swiss"... experienced specialists in the manufacture of these precision tools for more than 40 years. And when you want the most serviceable Swiss-Pattern Files, buy "American-Swiss"... preferred by experienced tool and die makers and machinists because of their clean, sharp, long-wearing teeth and uniform hardness.

American Swiss File & Tool Co., Elizabeth, N. J.

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SWISS PATTERN FILES

actuates a gear meshing with a rack cut integral with the quill. Quick, positive clamping of the quill in any position is accomplished by a hand lever at the left front of the vertical spindle head. The quill adjusting lever is fitted with an adjustable limiting stop for the repeated accurate positioning of the cut-

the machine are provided with wide, hand scraped bearing surfaces having long dovetail guiding arrangements. Adjustable taper gibs provide for accurate movement and alignment of both slides.

The table and knee saddle slides of

The table may be fed by hand or by power. Hand feeding is accomplished by means of handwheels having adjust-able micrometer dials. Power feed to the table is provided by a ¼ h.p. motor and is controlled by a single directional control lever. Power feed rates (4) are changed by means of a handwheel located on the left side of the machine column.

Where desired, the machine may be supplied with a cutter coolant pump which is mounted on the inside of the bed and is driven by a chain from the table feed power shaft. Used coolant is returned through strainer holes to the reservoir in the base of the machine.

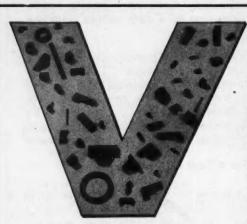
Specifications of the Industrial No. 0-9 Vertical Milling Machine are as follows: working surface of table, 24 x 6 inches; overall size of table, 24 x 6 inches; num-ber of T-slots in table, 3; size of T-slots, inch: distance between T-slots, 1% inches; longitudinal table travel (power), 12 inches; cross travel of table (hand only), 6 inches; vertical travel of head, 3 inches; throat distance, center line, 61/2 inches; maximum distance from spindle nose to top of table, 8 inches, minimum distance, 0; diameter of spindle, 1 inches; diameter of spindle nose, 17/32 inch; spindle speeds, 325, 475, 825,



DRILL and PILOT BUSHINGS

Frictionless
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poring, turret to a piloting, etc. Won's
stick or clog. Dust
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BIERN & ANHOLTT TOOL CO. 1312 Mt. Elliott Ave. Detroit, Mich.



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Take a Tip from Willey's

Tungsten Carbide blanks as illustrated are manufactured exclusively under WILLEY'S Patents in grades suitable for all your machining requirements. Whether you are machining tough steel, cast-iron, malleables or aluminum, etc., there is a grade of WILLEY'S METAL that meets your needs for maximum efficiency. Specify WILLEY'S METAL and follow the VICTORY

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It's milled on sides, front end and base for interchangeable and accurate positioning on face plate

or machine bed. Quickly detachable from its swivel base, it can be transferred from bench to machine for drilling, milling or tapping — and back to bench again without removing work from jaws. Quickly and easily converted into milling, drilling and tapping jigs. Hardened steel block with V-shaped grooves (furnished with vise) holds round or irregular shapes securely. That's why "Yankee" Vises speed production. That's why they are in such demand in modern machine shops producing for Victory.

Yankee" Vises are made in four jaw widths and two styles. No. 991—1½"; No. 992—2"; No. 993—2¾"; No. 994—4". Same sizes with detachable swivel base feature are Nos. 1991, 1992, 1993, 1994. Order from your supply house or write North Bros. Mfg. Co., Dept. MMS-5, Phila., Pa. Support orders with preference ratings whenever possible.

"YANKEE" TOOLS

Make good mechanics better North Bros. Mfg. Co., Phila., U. S. A. Established 1880 Use Them Over and Over



Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for \$1.00. Give arbor size.

Size and price list sent FREE!

DETROIT STAMPING CO.

1,700, 2,475, and 3,800 r.p.m.; table feeds, ¼, ½, ¾, and 1½ inches per minute; floor space required, 38 x 34 inches; distance from floor to support pads for machine at top of base, 30 inches; approximate net weight, including all electrical equipment, 850 lb.; approximate shipping weight, 950 pounds.

Kidder "Little Blacksmith" No. 43

Produced by The J. F. Kidder Mfg. Co., Inc., 360 Colchester Ave., Burlington, Vt., the Kidder "Little Blacksmith" No. 43 illustrated herewith is designed to cut up to a 5 x 5-inch 90-deg. notch out of a corner or side of a sheet in



Kidder "Little Blacksmith" No. 43

TO PLANT OFFICIALS CONCERNED WITH INCREASING WAR PRODUCTION...

LATEST Complete INFORMATION
ON PRECISION GAGES, FIXTURES,



We invite you to have this valuable handbook at your fingertips for ready reference on our entire line of Quality Precision Gages, including details about our COMPLETE GAGING SYSTEM FOR CARTRIDGE CASE INSPECTION. We believe you will find this catalog extremely helpful in your endeavor to expedite production of essential war material. Fill in the Coupon below and

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Yale Model KM30-2 Center Control Tele scopic Tilting Fork Truck

gular piece 5 inches long out of the side of a sheet up to 4 inches thick in one stroke, with rectangular notches of greater length being cut by means of two or more strokes of the unit. The Kidder Little Blacksmith No. 43 is said to be fast acting and

is equipped with gages so as to is equipped with gages so as to enable accurate work to be produced. The unit has a maximum capacity for 14 gauge mild steel and 10 gauge aluminum. Bench space occupied by the machine is 15 x 13 inches. Weight of unit, 200 rounds. pounds.

one stroke. Notches up to 5 x 5 inches but of greater angle than 90 deg. can be cut by means of two strokes of the machine. According to the manufacturer, the machine will notch a rectan-

Yale Model KM30-2 Center Control Telescopic Tilting Fork Truck

Designated as the Yale Model KM30-2, a center control telescopic tilting fork

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For Feeding Bullet Cores, Discs, Nuts, Rivets, Screws, Pins, and Special Parts.

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YOU DON'T NEED

A BULKY DUST-COLLECTOR FOR GRINDING TOOLS!

A dust collector which really does a good job and meets the State Safety Code is large and bulky. And it does not prevent burning the tool. A Hisey Wet Grinder arrests all dust and grinding grit and keeps the tool cool. It is self-contained and compact and requires little room. You can place them anywhere in the shop without dust injuring lungs or machinery.



Made in sizes with 10 to 30 inch diameter wheels. Also made for drill grinding, single wheel types, and combination wheel for snagging grinding. V Belt drive assures correct speed for any size wheel.

WRITE FOR CATALOG 60GM.



truck for use in moving, tiering, stacking, and storing materials has been placed on the market by The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa. The truck measures 98 inches long overall, including 30-inch fork, and has a capacity of 2,000 lb. The compact, flexible design permits the unit to be quickly and easily maneuvered in narrow aisles, around sharp corners, and in close quarters carrying full capacity loads.

The Yale Model KM30-2 Truck is provided with a single fork height lift of 1½ inches and an additional telescopic lift of 129 inches, and has four forward and reverse speeds. All controls of the unit are located in easily accessible positions, and the hoisting and tilting controls are fitted with mechanical limit safety stops. Seat for operator is located in the center of the truck chassis frame in a protected position and in such a manner as to assure operator full visibility in all directions.

Other features of the Yale Model KM30-2 Truck include adjustable alloy steel forks; alloy steel roller chains; heavy section, accurately machined upright channels; and tilting action for ease of loading plus complete safety when loads are being transported.

Houghton Gum Solvent "B"

A gum solvent in concentrated form which can be added to the oil in a hydraulic system whenever there is evidence of poor indexing or improper operation, thereby making flushing unnecessary and reducing production-time loss to a minimum, is now being marketed by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pennsylvania.

The solvent, which is known as Houghton Gum Solvent "B," is used in

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.



F & M SALES COMPANY, HOLLYWOOD, CALIF.



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FORGE HAMMERS

Made in 5 sizes—25 lb to 500 lb ram (illustrated here is 250 lb ram). Adaptable to a wide range of work, light or heavy. An ideal piece of modern equipment for maintenance as well as production work.

OPERATED
EITHER
MECHANICALLY
OR
ELECTRICALLY;
THESE
HAMMERS
ARE NOT
STEAM
OR AIR
HAMMERS.

Adjustment for different thicknesses of dies and material is provided—an outstanding Murray feature. Extremely powerful, yet simple in design, and so Flexible in operation Murray Power Driven Forge Hammers can be operated under perfect control, with little effort. Stability is built into them, and this means longer life and less maintenance cost. The ram design is a special feature. Ram is free from any obstruction thereby assuring full vision of the work, which makes possible use of longer guide. Write for details, and ask us about our repair and parts service.

D. J. MURRAY MFG. CO. Wausau, Wisconsin

Established in 1883. Offices in Principal Cities

small proportions of 3 to 5 per cent of the oil in the system, changing any accumulation of sludge, gum, or contamination into solution, thus providing for smooth operation of machinery, also for quick and thorough draining of hydraulic system when fresh oil is to be added.

Duplex M-6 Abrasive Band and Disc Grinder

Designated as the Duplex M-6, a combination abrasive band and disc grinder which can be used for performing both rough and finish grinding operations has been placed on the market by the Walls



Duplex M-6 Abrasive Band and Disc Grinder

Sales Corp., 96 Warren St., New York, N. Y. The machine, which is of the pedestal type, is furnished complete with a ¾ h.p. motor, fully enclosed V-belt drive, balanced steel pulleys, dustproof ball bearings, Alemite lubricating system, and grease gun. Band tension is automatically controlled by a time tested positive-acting tension spring arrange-

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WOMEN WORKERS CAN HANDLE MASONITE* DIE STOCK



More and more women are helping to speed production in America's roaring airplane factories—and many of them are working with Masonite Die Stock.

Because this amazing semi-plastic material is only one-sixth the weight of steel, forming blocks, jigs, templates and assembly fixtures are easily handled by women.

With all its light weight, Masonite Die Stock has great compressive and flexural strength . . . stands up under heavy-duty production runs . . . can be machined and fabricated in metal-working or pattern shops with great speed . . . saves manufacturers precious time, as well as expense in tooling up and getting into production . . . conserves steel for other vital purposes.

Masonite Die Stock is available in thicknesses of ½ to 4 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further details, fill out and mail coupon below.

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ment, while a single-action thumbscrew is provided to assure accurate belt alignment.

Standard equipment of the Duplex M-6 Grinder also includes a bevel attachment which is adjustable at any angle to the abrasive band, and an adjustable disc grinding table. The steel disc of the unit is designed so that it can be readily removed if desired.

Specifications of the Duplex M-6 Abrasive Band and Disc Grinder are as follows: band grinding table, 7% x 14 inches; disc grinding table, 3½ x 5 inches; abrasive band, 6 x 48 inches; disc, 14 inches diameter; drums, 5 x 6½ inches; motor, % h.p.; speed, 1,450 r.p.m.; floor space, 20 x 22 inches; weight, 500 pounds.

Apeco Photocopy Machine

Designated as the Apeco, a foolproof photocopy machine for quickly producing duplicate copies of blueprints, letters, records, receipts, drawings, tracing, photographs, work orders, and so on, up to 18 x 22 inches in size is now being manufactured by the American



Apeco Photocopy Machine

Photocopy Equipment Co., 2849 N. Clark St., Dept. 174, Chicago, Ill. The machine is said to be unusually simple to use, thus enabling inexperienced operators to readily produce perfect photocopies of

Firm Clamping Without Overpressure

A Production Vise With a Pressure Adjustment

There is never any danger of distorting soft metal parts if you use a Presto-Vise, because its jaw measure can be adjusted to the type of metal that is being clamped. Once adjusted for a certain pressure, it stays adjusted, saving time on each operation, and also eliminating spoilage losses due to distortion of parts. Attachments furnished make it ideal also for use as a drill jig.





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DEFSTO-VISE

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May,



Using virtually any workable metal, we can furnish flexible hose or tubing for anything from a simple spout to a high pressure hydraulic line (American Seamless) that can be flexed millions of times without breaking.

If you need a flexible connector for conveying air, water, oil, steam or fuel—for connecting misaligned or moving parts, or isolating vibration—chances are we have a type of hose or tubing that will do the job better.
Complete descriptive literature available on request.

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American Metal Hose

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any written, typed, printed, drawn, or photographed matter.

The Apeco Photocopy Machine has practically no working parts, thus reducing repair and maintenance to a minimum, and is designed for operation on alternating or direct current. The unit weighs but 10 lb. and measures 12 x 12 x 24 inches in size, thereby enabling it to be readily set up on a desk or table.

Ohio Revolving Tables

A line of revolving tables for use on horizontal boring, drilling, and milling machines as well as other machine tools is now being introduced by The Ohio



Ohio Revolving Table

Machine Tool Co., Kenton, Ohio. Precisionly constructed, the tables are very accurately graduated in ½ degrees and are available with positive indexing arrangement, any number of index positions required being readily furnished.

The T-slots of the tables are carefully machined from the solid and are of sufficient size and number to allow for firmly clamping workpieces or fixtures directly to table top. A depression is provided in the center of each table for locating fixtures, and so on.

STERLING LATHE TURRETS



7½" Square Steel Lathe Turret Bodies, fully machined, with handle and four forged steel wedges, less base.

Price: \$40.00 each, shipping weight 70 lbs. Immediate delivery from stock.

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(R) CIRCLE "R" Metal Cutting Tools

Made by Perfectionists



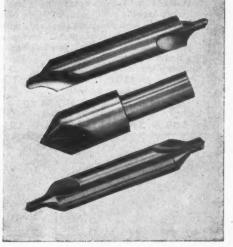


Also Metal Cutting Saws of all types

CIRCULAR TOOL CO., INC.
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Our combination drills and countersinks are milled on this machine designed by our own engineers. Depth of cut and spiral are automatically controlled, assuring accuracy and uniformity.



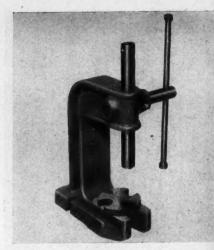
The king pin of each table is of large diameter, and the table top is carefully honed to a very close fit with this pin. An anti-friction device is provided for raising table top from its bearing. By means of a single movement of a lever, the table top is raised completely from its bearing and supported by large diameter anti-friction bearings, thus providing for very easy movement of the table top by the hand crank on the worm shaft or, when the worm is thrown out of mesh, easy and rapid revolving of the table top by hand.

Ohio Revolving Tables are available in round and square types covering a wide range of sizes. Power feed for both types can be furnished on special

order.

Lempco Hand Arbor Press

A fast and smooth-operating, direct leverage, hand arbor press of rugged I-beam design for assembling, disassembling, bending, straightening, and other operations is announced by Lempco Products, Inc., 5682 Dunham Rd., Bedford, Ohio. The press, which has a capacity for work up to 14 inches in



Lempco Bench Type Hand Arbor Press

diameter, is equipped with a snap ball check which permits the ram to be "spun" down to the work quickly. The ram, pinion, and pinion shaft are made





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permit forceful, effective blows without battering, scarring or marring. They protect fine finishes, delicate insulation, hardened parts and costly machinery. They far outlast other mallets, hold a true striking face and, because they absorb recoil, they are less fatiguing on continuous use operations (as pounding in winding, assembly work, etc.). Speed production—reduce spoilage. All sizes. Weighted or unweighted.

Replaceable Heads
Replaceable Insert Faces
are available for C.R.
Hammers ... make each a
"lifetime" tool.

CHICAGO Rawhide MFG.CO.
1281 ELSTON AVE.. * CHICAGO.ILLINOIS

of selected quality steel.

The design of the machine also includes a heavy wrought steel pressing block having 1½, 1½, 1½, and 2-inch knotched openings. In addition, the machine features a large machined table surface. Moving parts of the unit are provided with machined bearings so as to reduce friction to a minimum.

The Lempco Hand Arbor Press is available in 2 and 3-ton models and in

both bench and wall types.

Gorham Welding Metal

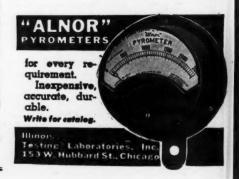
A welding metal for use in repairing and salvaging damaged cutting tools and dies is now being marketed by the Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich. Gorham Welding Metal is a cast ferrous alloy that is said to incorporate the characteristics of high speed steel from the standpoint of toughness, while at the same time providing the wear resistance of cemented carbide. It is available in standard welding rod form.

ard welding rod form.

Gorham Welding Metal has unique properties in that it can be used as welded or it can be welded and drawn to increase hardness and toughness. The welded tool can also be annealed so as to be readily machined and subsequently heat treated and drawn. This variety of treatments is said to make it possible to produce tools and wear surfaces with Rockwell hardnesses of 60-70 C and having unusual red hardnesses and re-

sistance to abrasion.

Typical of the many broken tools which can be reclaimed with Gorham Welding Metal are milling cutters. According to the manufacturer, any number of teeth from one to a dozen can be built up with Gorham Welding Rod, reground and heat treated without lowering the hardness of adjacent teeth.



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HIGH SPEED

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- Model No. 90-10—Horizontal type. Assembles to many makes of surface grinders in two minutes.
- Grinds all kinds of hard to get at surfaces, angles, slots and recesses.
- Improved, preloaded spindle is fog lubricated.
 Speeds up to 26,000 rpms.

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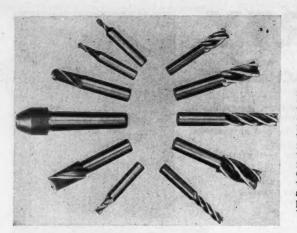
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237 Georgia Ave. Providence, R. I.



Tomorrow's Tools for Today's Tas

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Fray "Kurl Kut" End Mills

sion, such as grinder rests, lathe centers, shear blades, clutch fingers, gages, and so on. This is done by welding a layer of the metal on the wear surfaces and grinding to size. In addition, new turning and special grooving tools may be made with Gorham Welding Metal, which is said to be easily applied by the oxyacetylene process by any experienced welder.

Lathe tools, broaches, reamers, and other tools that are worn out or ground undersize may be similarly treated and salvaged.

Use of Gorham Welding Metal is also said to prolong indefinitely the service life of tools and machine parts that are subject to steady wear and high abra-

Fray "Kurl Kut" End Mills

Fray Tool & Reamer Co., 503 W. Windsor Rd., Glendale, Cal., is now marketing a line of end mills designated as "Kurl Kut." Available in 11 styles, each designed for a specific purpose, the end mills are made of the finest high

ACCURATE Sheet Metal Work

SPARE PART BOXES

under Government Specifications

Carefully and rapidly produced in Stackbin's modern plant, Stackbin-made spare part boxes are meeting Navy requirements and are in use on Navy ships.

Stackbin offers you unusual facilities to fabricate these boxes and other sheet metal products

Behind these special products stand the designing experience and production facilities of a leading maker of parts and materials handling equipment. You can take advantage of their knowledge of sheet metal fabrication. Write Stackbin Corp., 53 Troy St., Providence, R. I., to find out what they can do for you.

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STACKBIN CORP., Providence, R. I.

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Tested under all manner of shop conditions, Winter taps have proven to be consistently good. Now, with production so vitally important, it is imperative that taps turn out vast quantities of perfectly threaded pieces. It is this tested quality to produce long after you would expect to discard them that has made Winter Taps the approved threading tools in hundreds of war factories.

THE NATIONAL TWIST DRILL & TOOL CO.

DETROIT, MICHIGAN



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work for which they are to be used.

The Fray Kurl Kut line of end mills includes single-end end mills, sizes ½ to 2 inches; long single-end end mills, sizes ½ to 2 inches; extra long end mills, sizes ½ to 1½ inches; two-flute end mills, sizes ½ to 1½ inches; long two-flute single-end end mills, sizes ½ to 1½ inches; ball end mills, sizes ½ to 1½ inches; extra long ball end mills, sizes ½ to 1½ inches; Brown & Sharpe taper shank end mills; either regular or four fluted, sizes ½ to % inch; and Brown & Sharpe

taper shank two-flute end mills, size ½ to 1 inch.

The Fray line also includes fluted chucking reamers with straight shanks, sizes ½ to 1½ inches; rose chucking reamers with straight shanks, sizes ½ to 1½ inches; collets up to and including ½ x ½ inch, all with straight shanks and either Brown & Sharpe or No. 2 or 3 Morse tapers; solid counterbores, sizes ½ to 1 inch; and end mill holders for single or double-end end mills with %, ½, or %-inch diameter shanks.



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BY A QUICK, EASY, INEXPENSIVE METHOD Your business letterhead will bring literature. WATTS BROS. TOOL WORKS Wilmerding, Pa.

Turco "Duramask" Floor Masking Material

To speed up the time-consuming job of removing accumulated paint spillage and overspray from painting room floors, Turco Products, Inc., Dept. 110, 6135 S. Central Ave., Los Angeles, Cal., has developed a durable floor masking material to be known as "Duramask." The material is a white, thick liquid which looks and is handled very much like paint. Duramask can be applied to a floor with a kalsomine brush and is said to quickly

SAVE TIME ON INTRICATE ANGULAR SET-UPS ...

MULTI-SWIVEL VISE



Fully universal . . . three swivels simplify the setting of compound angles. Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or multi-swivel vise.

The Platen greatly increases the capacity of the unit. Vise and Platen are interchangeable.

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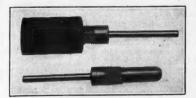
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Designed for precision work. Used for removing burs, fins, tool marks on various types of production work. A very indispensable aid in speeding up production.

Write for catalog and free sample.

Field Abrasive Specialty Mfg. Co.

HURON ALL STEEL GAGE HANDLES TAPER-LOCK and TRI-LOCK



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5555 CONNER AVE. - DETROIT, MICH.

Boyar-Schultz PROFILE GRINDER No. 1



FOR TOOL AND DIE SHOPS and CONTOUR GRINDING IN PRODUCTION

Long a popular machine tool in the tool and die shop. Boyar-Schultz Profile Grinder No. 1 has also been found to be equally efficient in production where contours and profiles must be quickly and accurately ground.

The spindle, operating at the high speed of 20,000 R. P. M., permits the use of small diameter wheels in confined openings and small radii.

Boyar-Schultz Profile Grinder No. 1 is especially useful in grinding and fitting dies and punches; grinding die clearances and grinding cams and templates to scribed lines.

Circular Sent On Request

BOYAR-SCHULTZ CORPORATION

2120-F Walnut Street

Chicago, Illinois

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When a job calls for one to four tool changes and a turret lathe isn't available... put a Colwell turret on your engine lathe. Then you'll get semi-automatic operation. For it only takes a few seconds to accurately change from one tool to another.

Colwell turrets carry a cutting-off tool and 3 square tool bits or 4 tool bits. Send for our new folder and specifications.

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dry to a hard, durable, nonskid surface which cannot be injured by ordinary foot or truck traffic. When the accumulation of paint on the protective coating is so great as to require its removal, the coating can be dissolved with water and the paint film mopped away.

paint film mopped away.

Turco Duramask can also be used to protect machinery, walls, workbenches, and other surfaces from paint, oil, or grease spillage. In addition, the material is said to be useful on airplanes, cabinets, and so on, where an unusually hard surface is required or where a surface must be protected from finger marks.

According to the manufacturer, Turco Duramask Floor Masking Material is noncorrosive, noninflammable, and noninjurious to the skin, and provides a protective coating which can be written upon with an ordinary lead pencil, marked with rubber stamps, and so on.

"Hercules" No. 2 Marking Outfit

Small knurled head thumbscrews, cap screws, nuts, and similar parts are said to be quickly and easily marked by



"Hercules" No. 2 Marking Outfit

means of the "Hercules" No. 2 Marking Outfit shown herewith, product of The Acromark Co., 9 Morrell St., Elizabeth, New Jersey.

beth, New Jersey.
In use, the part to be marked is dropped into a form or anvil in the base of the unit and the top of the

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Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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Chicago, III.

On The Level

they're better!

Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 23/4", 33/4", 51/4" and 71/2" closed heights.



Ask your machinery dealer.

Templeton, Kenly & Co. Chicago, Illinois

Better, Safer Jacks Since 1899



The work-bench that you need today we planned . . . years ago

In most every case you'll find we can quickly supply just what you want from the 1367 ready-made work-bench combinations that are part of the line of

Fig. 928. Pat'd and Pats. Pending. Drawer is extra.

SHOP EQUIPMENT

These work-benches are all of sturdy construction, made to stand firm and rigid without costly, time taking bolting to the floor. The "Hallowell" Shop Equipment Catalog will help you make your selection. Send, today, for a copy.



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ram struck with a rawhide maul or mallet, thus causing the type or insert die in the small "Hercules" holder on the end of the ram to be forced down onto the part and an accurate mark produced. A spring and collar with set screw adjustment hold the type holder clear of the anvil which is tapered to allow for easy insertion and removal of parts.

The Hercules No. 2 Marking Outfit can be used to produce from approximately fifteen 1/6-inch characters in one line (or 30 in two lines) up to four 1/2-inch characters in one line. If the parts

to be marked are soft, such as fiber or plastic time, pay, or tool checks, these marking limits may be exceeded.

Reynolds Coolant Systems

Designated as the Nos. 1-S, 2-S; and 206, three improved coolant systems for machine tools are announced by the

Reynolds Machinery Co., 211 Eddy St., Providence, R. I. The No. 1-S system, illustrated herewith, includes a 16 x 10 x 11-inch tank and geared pump which is powered by means of a ½ h.p. motor. The system, which has a capacity of approximately 7 gallons, is available in 110-volt single phase, 220-volt three phase, and 550-



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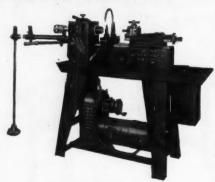
Reynolds No. 1-S Coolant System

three phase, and 550-volt three phase models, and is designed for use with milling machines, screw machines, lathes, and other machine tools requiring coolants and cutting oils.

CENTERLESS GRINDING

ACCURACY — PROMPT SERVICE
Commercial Centerless Grinding Co.
6603 Cedar Avenue Cleveland, Ohio

STEVENS



Write for Illustrated circular

Screw Machines

Built in two sizes with Stepless Speed Variations up to 2400 revolutions. Motor driven with convenient electric controls for efficient operation. Other salient features are

- SIMPLE AND DURABLE CONSTRUCTION
- . MEANS FOR RE-ALIGNING TURRETS
- . EASE IN OPERATING
- MOTOR-DRIVEN COOLANT PUMP
- . LARGE CHIP AND OIL CAPACITY
- . MAGNETIC BRAKE
- . ALL PARTS ACCESSIBLE
- · SAFETY

JOHN B. STEVENS INC.

482 CANAL STREET

NEW YARY N Y

Builders of dependable machinery for 35 years.



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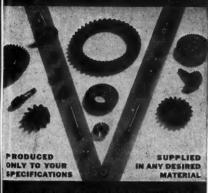
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A VERSATILE Light for Precision Work

Many plants with overhead fluorescent lighting have equipped machine tools with glareless, fatigue-saving VIMCOLIGHTS. Adjustable, versatile—just the light for close work and "blind-spot" operations. Steps up efficiency; cuts down rejects. Send for circular.

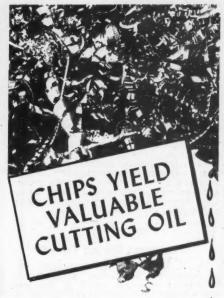
PRECISION GEARS $\frac{5}{16}$ to 16"



DETROIT BEVEL GEAR COMPANY

8130 JOS. CAMPAU AVE. DETROIT, MICH.

Makers of Zuality Gears for 30 Years



Reclaims up to 98.6%

Hidden in these chips are large amounts of valuable cutting oil. Tolhurst "Chip Wringers" recover as much as 98.6% of this oil through application of centrifugal force. Not only do you save money, but the plentiful supply reclaimed results in a more generous and conscientious use of your cutting oil.

Investigate Tolhurst "Chip Wringers." Find out how they save oilreduce tool wear . . operated efficiently by unskilled help. Write and can be

for new, free bulletin. DIVISION OF AMERICAN MACHINE AND METALS, INC. East Moline, Illinois



LHURST WRINGERS The No. 2-S system includes a geared pump but no tank, and is powered by means of a ½ h.p. motor. Like the No. 1-S, this system is available in 110-volt single phase, 220-volt three phase, and 550-volt three phase models, and is designed for use with milling machines, screw machines, lathes, and other machine tools employing coolants and cutting oils. The capacity of the system is approximately 12 gallons.

The No. 206 coolant system comprises a 20 x 16 x 16-inch tank and rotary pump which is driven by means of a ¼ h.p. motor. Available in 110-volt single phase, 220-volt three phase, and 550-volt three phase models, this system has a capacity of approximately 15 gallons and is designed for use with grinding machines, multiple spindle drills, and other machinery employing water

and soluble oil solutions.

Sturtevant Spring Tester

The P. A. Sturtevant Co., Addison, Ill., announces the Sturtevant Spring Tester illustrated herewith which is designed for testing compression springs up to 2½ inches in diameter x 7 inches long.



Sturtevant Spring Tester

Use of this unit not only makes it possible to rapidly measure the recoil pressure of a spring when compressed to





No. 575 Pot-Hardening Furnace

Here's the unit that will do a good job, speedily, and at low cost. Equipped with lid-lifting mechanism which raises lid easily and locks it in UP position. No. 575 is lined with 8" hi-temperature, quality insulation. Pot size, 14" diameter and 20" deep. Location of burners, near top of combustion chamber, insures longer pot life. Vent damper regulates flow of exhaust gases. Top ring, in 3 sections, prevents cracking or distortion. Use with large blower for maximum performance. \$325 F.O.B. Factory—Blower Extra.

JOHNSON GAS APPLIANCE CO. 585 E Ave., N.W., Codar Rapids, Iowa

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MARK IRON, STEEL and CARBIDES





Original Electric Etcher. 3000 in Daily Use Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements. • Also a combined Etchograph and Demagnetizer.

Write for circulars and prices.

BREWSTER-SQUIRES CO.

40 CHURCH ST.

NEW YORK



of the Many Ways SLOTMASTER Can be Used to Save TOOLS AND SETUPS

SLOTMASTER can be used on any round or flat-on-round overarm milling machine and will do precision work that normally requires a multi-thousand dollar machine. (All working parts are of tool steel heat treated and ground to close tolerances). It takes but little time to change over from one head to the other... the stroke of the ram is adjustable from

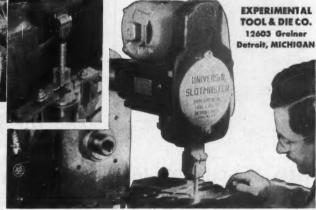
0 to 4"...the speeds range from 50 to 250 S.P.M. The tool holder is of the clapper box type and can be turned in any position. SLOTMASTER comes complete with pulleys, motor, mounting brackst, etc.... Send for a 4-page catalog—give specifications of the milling machines you wish to equip. Immediate deliveries on high priorities.



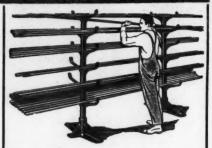
Below: Conventional setup on a round over-arm milling machine; thumbnail: set-up for lapping a deep impression die.

Upper left: Set-up for cuting a spline.

Above: Set-up for cutting an internal gear.



A TIME SAVER



The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN 26-M.

BROWN ENGINEERING CO. READING PA



Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.

any predetermined length but to also accurately match sets of springs, such as valve springs for internal combustion engines.

Designed for ready bolting to a bench, the Sturtevant Spring Tester can be operated with any accurate standard torque wrench which is attached by inserting the drive square of the wrench into the female square of the compressing tongue of the testing device, the torque wrench not only serving as the operating lever but as the measuring element as well. The spring to be tested is compressed against a rigid platform to prevent accumulated errors in reading, a sound device indicating when the spring has been compressed to the test point.

The operation of the Sturtevant Spring Tester is very simple. The unit can be readily adjusted for any testing operation by merely regulating the height of the platform to correspond to the length at which the spring is to be tested. The platform is mounted on a threaded column and is raised or lowered by revolving. The column includes a milled flat containing a stamped scale which is calibrated to sixteenths of an inch. Adjustments to in inch of platform height for test lengths can be read directly on this scale. For finer adjustments, the platform can be given a quarter turn, thereby raising or lowering it is inch, the surface of the platform being marked for readings of it, in, and it inch. For even finer adjustments, the periphery of the platform is divided into 21 ridges which permit adjustments of test lengths to 0.003 inch.

With the platform at the desired position and a torque wrench attached, a spring can be tested by placing it on the platform and pulling down on the wrench. This action causes the tonque of the testing unit to compress the spring against the platform, the recoil pressure of the spring being indicated

GOOD MACHINE TOOLS INSURE PERFECT RESULTS AND TOP PRODUCTION

Specify "QUALITY" H. S. Woodruff Keyway Cutters When You Have a Tough Job To Lick

QUALITY TOOL WORKS

May,



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly.

One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co. TOLEDO, OHIO DEPT. MS

MGREN ANGLE VISES



For Quick — Accurate Set—ups
PALMGREN Heavy Duty Angle Vises are built sturdy and
rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay
locked under severe service and save valuable hours
otherwise wasted in tedious make-ready, wedging or
making the service and save valuable of the property of the service wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

IMBARING TEMPORARY JIGS and LISTURES.

Jawa sea hardened and ground Special outstanding Sastures are the size and opening of jaws—4" Jawa open full 6" the 5" Jawa open full 6" etc. with corresponding depth of Jawa. Vise can be used as ordinary vise when lowered to horizontal position. Service bases furnished if desired. Bisset 4", 6" and 6" Jawa and openings. Frompt deliveries. While the base has been subject to the control of the size of the siz

PRECISION WORK AT ANY ANGI

COMPARATOR WITH TILTING HEAD

A Precision Indicating Gage Designed to replace flush pin gages.

The ideal instrument for measuring lengths, depths and recesses. The tilting head permits the instrument to be set at any angle for rapid, precision checking.



AMERICAN MEASURING INSTRUMENTS CORP. New York, N. Y. 240 West 40th St.

Manufacturers of Gages, Jigs, Fixtures and Service Tools

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JOHNSON'S



Adjustable Limit SNAP GAGES

Keep down your gage

MODEL



costs by using these fast, accurate gages. Reset when necessary.

Also: Flat and Cylindrical Plug Gages, Built-Up and Solid Snap Gages, Flush Pin and many other types of gages.

1 43

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W. E. JOHNSON CO., Little Falls, N. J.

Counterbores
High Speed
Back Spot Facers
Core Drills
Flue Sheet Cutters
Interchangeable
and Solids
Also Specials
With for Catalos

BICKNELL - THOMAS COMPANY
GREENFIELD • MASSACHUSETTS

on the dial of the torque wrench. When the point is reached at which the recoil pressure of the spring is to be measured, the tone device of the unit is sounded and the operator takes a reading from the dial of the torque wrench.

The Sturtevant Spring Tester cannot only be used for testing springs of all types within its capacity but also for proof-testing the strength of press fits and for light arbor press production operations involving the rapid application of accurately gaged pressures.

Mattison No. J-135 Abrasive Belt Idler Stand and Pulley

Present grinding and polishing lathes are said to be easily adapted to the use of factory-coated abrasive belts through



Mattison No. J-135 Abrasive Belt Idler Stand and Pulley

the addition of the Mattison No. J-135 Abrasive Belt Idler Stand and Pulley illustrated herewith, product of the Mattison Machine Works, Rockford, Ill. The stand is placed at the rear of the lathe, permitting the use of an abrasive belt running over a contact roll or wheel on the lathe and traveling back around the idler pulley. With this arrangement,

U. S. HEADS

STANDARD SINCE 1915

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The United States Drill Head Co.

1954 Riverside Drive CINCINNATI, OHIO

Hand Cut ROTARY FILES

High Carbon and High Speed Steel. All sizes—all shapes. Write for catalog.



STRATFORD

CONN.

CRITERION Boring Heads

CONSTANT ACCURACY...

Criterion Heads maintain original accuracy far beyond usual expectation. They are smooth, compact, rigid. Feature large graduated dial. Lead screw is hardened tool steel, with threads ground from solid after hardening, assuring constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request literature.

Lead Screw ground from solid AFTER hardening.



BEVERLY HILLS, CALIFORNIA

grinding is done on the belt instead of on the set-up wheel.

The Mattison No. J-135 Stand is of sturdy construction throughout. The ball bearing idler pulley is mounted on a yoke which can be swiveled by a handwheel to align pulley with belt. Handwheel adjustment is also provided for controlling position of belt on pulley together with cam arrangement to allow for easy changing of belt.

The entire assembly swings on a hinge shaft mounted on the base. Slack in the abrasive belt is automatically taken up by a sensitive spring, tension of which

PRESSES
FEEDS
AUTOMATIC
EQUIPMENT
THE V & O Press Co., INC.
HUDSON N.Y.

is adjustable to suit various types of work. Provision is also made for turning column and upper assembly of stand halfway around where required.

United Cinephone Electronic Switch

An electronic switch for relaying, motion limiting and gaging, and liquid level controlling applications is now being marketed by United Cinephone Corp., Torrington, Conn. The design of the switch includes a Type 6J5 vacuum tube which provides for unusual performance characteristics. The housing of the switch, which is compactly designed to permit easy mounting in confined areas, is made of 16 gauge steel for strength and is provided with a durable black baked crackle finish.

Operation of the switch is effected

Operation of the switch is effected when the switch input connections are closed by contacts or when a body having an electrical resistance in the range from 0 to h1 megohm is inserted in the circuit. Under these conditions, a minute current flow occurs across the input. This tiny current flow, which is

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Safety Plus
PRODUCTS
Serving With
Our Armed
Forces!



Today, The Chicago Screw Company products are performing an essential service in the war production program. These superior quality, precision-made screw products are being utilized in the construction and maintenance of fighting ships, planes, tanks, trucks and machinery for allied war needs.

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Order from your distributor!

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Micrometer OFFSET BORING HEADS

Ofisets 1/2"-Head 3" diameter. Micrometer Dial 50 divisions-.001".

Three Tool Holes-one hole runs true with arhor

All parts nickel-chromium steel, SAE 3140. Two 1/2" Boring Bars fitted with H.S. Tool. Bits and Three Wrenches, furnished with each head.

FRAY MACHINE TOOL CO., INC.

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Manufacturers of "All Angle" Milling Machines and Attachments

ANNOUNCING "AIR-CLAMP"



Wherever a drill comes down, something must hold the work. Wherever a drilling-lig is required, Air-Clamp will simplify it. Wherever speed is desired, Air-Clamp holds with relentless pressure; is undisturbed by size variations (such as in castings), it scoffs at vibration (how many drills have been broken due to faulty hold-downst), charter, snagging. Air-Clamp holds work of any size or shape in any position, at any angle. It can pay for shape in any position, at any angle. It can pay for itself on a single fixture; it can save its cost on a few days' drill-press output. Reduces operatorfatigue. Saves hours and dollars in drafting reom, jig department, tool room and production line Air-Clamp fits any drill-press having a cylindrical column. Special fixtures for Tee-slotted tables, light milling work, etc. Hand and/or foot control. Shipped on approval to responsible concerns.

MEAD SPECIALTIES COMPANY 15 S. Market St. Dept. 43-AA Chicago, III.



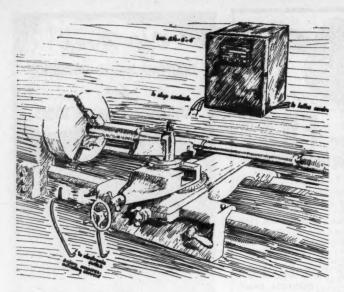
Enother **WAR-TIME SUGGESTION** by Madison-Kipp

If you use Tungsten Carbide Tools you have probably had some rather troublesome tool upkeep problems. We have solved some of these problems in our own war production work by using Kipp Diamond Wheels in the Model H Kipp Air Grinder. Contrary to previously held ideas, it is entirely practical to diamond grind by hand. The Model H Grinder has a speed of 50,000 R.P.M. With this speed and Kipp Diamond Wheels, Tungsten Carbide tools car be ground right at the ma-

Carbide tools can be ground right at the ma-chine. The price of the Model H Kipp Air Grinder is \$29.75 and the price of a ¼ x ½ Kipp Diamand Wheel is \$5.43. Madison-Kipp Corporation, 208 Waubesa St., Madison, Wis.

Write for AIR GRINDER Cataloa

Model H



United Cinephone Electronic Switch

energize a relay, which accomplishes the switching of the external electrical load.

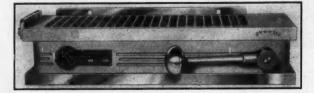
The fact that the current flow at the time of actuation is only three microamperes eliminates the possibility of contact arcing or pitting, thus permitting gaging or limiting operations to be performed to extremely close tolerances. Work surfaces are said to be unaffected by this minute current flow and the

life of gaging contacts greatly extended.

Availble in various models having different ranges, the United Cinephone

only three millionths of an ampere, is amplified more than a thousand times by the vacuum tube and then used to

KAR Permanent CHUCKS



Cannot Fall
Hold Work Tight
Generate No Heat

An outstanding and exclusive advantage of the KAR Permanent Magnet Chuck is its ability to hold smaller pieces securely due to the close spacing of the pole pieces. Release Easily
Used Wet or Dry
Use No Power

Model 618—6" wide x 18" long x 3¾" high—Available from Stock.



THE KAR ENGINEERING CO., Inc.

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MASSACHUSETTS

IMPROVED **BALANCING WAYS**



Four chilled iron discs rotate on special sensitive bearings. For balancing, straightening and true-ing. Write for details.

Swing	20"	40"	60"	72"	96"
Greatest Dis- tance Between Standards	20"	30"	30"	66"	88"
Capacity in lbs.	1,000	2,000	2,000	5,000	10,000

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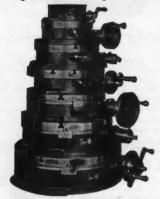
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Rockford, III.

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Sizes 9", 12", 15", 18" Ask your dealer or write us for eight page catalog.

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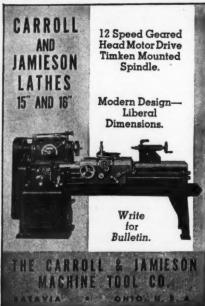
AMERICAN PHOTOCOPY EQUIPMENT CO.

2849 N. Clark St. Dept. H-3 Chicago, III.

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301





Electronic Switch is designed for operation on 110 volts, 50 or 60 cycle alternating current. Switches for operation on other supply lines can be obtained on special order. Current consumption of switches is approximately 5 watts.

Aero Tool Automatic Bucker

Simultaneous bucking and riveting operations are now said to be readily per-



Aero Tool Automatic Bucker

formed through the use of the Aero Tool Automatic Bucker illustrated herewith, product of the Aero Tool Co., Burbank, Cal. Designed for use in riveting airplane and other sheet metal parts, the tool is unusually light in weight and



May,



The WALTHAM Thread Miller will cut V, N.S., Acme, Whitworth and Metric threads, special threads. . . up to 2" diameter. (Insert above shows special head for internal threading.) Special head for relieving can also be furnished.

Write for new bulletin Np. M.

WALTHAM MACHINE WORKS, Waltham, Mass.

Also Smail Milling Cutters, Sub Presses, Pinion and Gear Cutting Machines.



Industry's New Tool . . . MEAD BURRING MACHINE

It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many kinds.

Prompt shipment

MEAD SPECIALTIES CO. 15 S. Market St. Dept. 5-A Chicago, III.

"Greenfield"

TOOL & CUTTER GRINDER

PLAIN OR UNIVERSAL

For sharpening straight, taper or rose reamers; spur, bevel, spiral, formed or end milling cutters; taps, drills, countersinks and counterbores. For grinding straight or taper arbors, keys, gages and the edges, sides and ends of flat, square, hexagon or octagon bars, etc.

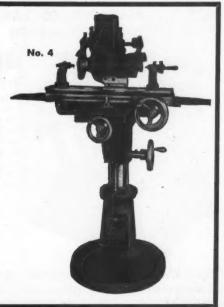
Swing over table—81/2".

Write for full details on this tool-room money saver.

PRODUCTION MACHINE CO.

GREENFIELD

MASS.



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easy to handle.

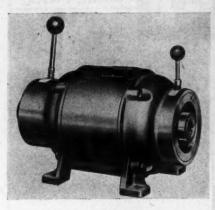
The Aero Tool Automatic Bucker with 22-inch throat weighs 14 lb. and with 36-inch throat, 16 lb., including gun. The tool can be used with any standard rivet gun and is available with specially designed heads for any type of aircraft construction. The construction of the tool is said to enable rivets to be instantly driven in accurate alignment, thus reducing rejects to a minimum.

Parallel yokes provide for riveting of side panels, wings, and leading edges, with special yokes allowing for riveting of engine cowling and other parts requiring extra clearance. Yokes are made of high grade seamless tubing with alloy steel castings fastened to ends, and are designed so as to eliminate deflection. On horizontal structures, rivets can be preloaded. On vertical structures, rivets can be inserted in the usual manner or can be preloaded and taped. Opening and travel of bucking bar are limited only by the accessibility of the part to be riveted.

Crozier Polishing Lathe

The Crozier Machine Tool Co., Hawthorne, Cal., has placed on the market

a polishing lathe having a clearance hole running entirely through it—a feature which is said to make the lathe particularly useful in polishing portions of long



Crozier Polishing Lathe

workpieces up to the maximum capacity of the machine.

The spindle of the lathe is driven by

DON'T WASTE SKILLED LABOR ON DRILL GRINDING! ANYONE CAN SHARPEN SMALL DRILLS WITH A



BLACK DIAMOND

THERE'S no need to waste high priced skilled labor on grinding drills when any apprentice, with a single Black Diamond machine, can produce quantities of precision ground, small gauge and fractional drills with—lips of uniform length—correct angle and proper clearance. The Web Thinning attachment grinds Notched—Colton or Crank Shaft Points just as efficiently and the Diamond Dresser keeps the grinding wheel sharp cutting.

If you use quantities of small drills, singly or in gangs—save valuable war production time and labor by installing a Black Diamond Drill Grinder at once.

Write for full details.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE NATICK, MASSACHUSETTS

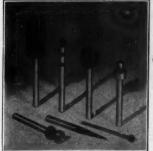
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ALJO Hand Cut ROTARY FILES



High Speed or Carbon Steel

Prompt Shipments

Aljo Rotary Files for nearly every purpose—contours, recesses, corners, grooves, radii and fillets—stock and specials.

Many styles in stock.

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ALJO MFG. CO., Inc., Southport, Conn.



21/4 x HEADBAND MAGNIFIER

Use of both eyes reveals true depth of details. Magnification of 2½x. Free working distance, 8" to 10", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Write for leaflet.

CARL ZEISS, INC., 585 5th Ave., New York Dept. H-51-5

for faster boring tool setting
— even by green hands . . .

BARTELT

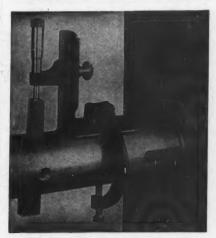
PEDESTAL MICROMETER

formerly called Bartelt Tool Setting Gage

* With this gage, you don't have to take trial cuts, mike them, and jog the cutter. Take a rough cut if you like, reset the tool to exact finishing size with this gage, and go ahead. Or, set the tool right to size to begin with, and do the job in one cut.

Designed by a Practical Man

An old boring hand thought this one up. It saves him a world of time—and it will do the same for the new fellows. Teach a new man how to use this gage, and watch him turn out the work! The gage can be used for a lot of other things, too.



Write for New Literature

BARTELT ENGINEERING COMPANY

1214 Partridge Ave. BELOIT, WIS.

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Don't Overlook This Possibility for Increased Production!

NICHOLSON EXPANDING MANDRELS

Save Time — Improve Shop Efficiency



TYPE A-STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price	
1A	1" to 1" 1" to 11/3"	\$12.00	
2A	1" to 11/2"	16.00	
3A	11/2" to 2"	23.00	
4A	2" to 3"	34.00	
5A	3" to 4"	40.00	



TYPE B-STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	1/2" to 18"	\$10.00
2X	16" to 21/32"	11.00
3X	21/32" to 3/4"	12.00
00	3/4" to 3/8"	14.00
0	%" to 1"	16.00
1 -	1" to 11/4"	18.00
2	11/4" to 1 18"	21.00
3	1 %" to 2"	29.00
A	2" to 21/2"	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO.

means of a motor which is completely protected against dust, abrasive materials, and so on. Work can be loaded and unloaded while the spindle is in rotation or the spindle can be stopped and loaded while stationary by operating a switch and mechanical brake control which first cuts off the power from the motor and then gradually, but firmly, applies a molded disc-type brake facing against a cast iron flange.

Positive opening and closing of the collet employed in the machine is provided through a double-face cam operating mechanism which is hardened and precision ground. No tools are required in making adjustments on the machine, which is available in 14 models varying in horsepower, capacity, arrangement for collets or chucks, and so on.

Brown Blow Gun

A lightweight, ruggedly constructed blow gun featuring an easy-operating trigger and balanced pistol grip which



enable it to be quickly and comfortably used for blowing chips, dust, dirt, filings, and scrap from castings, die surfaces, machine parts, motors, and so on, is announced by the W. R. Brown Corp., 5720 Armitage Ave., Chicago, Ill. The gun, which is designed for operation with individual or air line compressors up to 250 lb. pressure, is said to be ideal

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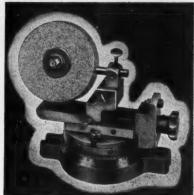
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NEW TYPE Radii and Angle DRESSER



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Detroit, Mich.



A "Free Wheeling" Clutch of simple design recognized for many years as "Standard Equipment for Automatic Dual Drive Operation – Automatic operation of 2 speed drive—As a ratchet permitting infinite adjustment and as an automatic backstop. Furnished in a number of types.

THE HILLIARD CORPORATION 117 W. FOURTH ST., ELMIRA, N.Y.

HILLIARD CLUTCHES



for cleaning work prior to painting.

The barrel of the gun is equipped with a nozzle which can be quickly interchanged with long spouts for blowing out deep cavities or hard-to-reach crevices. The gun is connected to air line through the handle which is tapped with standard %-inch pipe thread and is equipped with adapter for standard air hose fittings. A special solvent-resistant soft rubber air valve disc is provided to prevent waste of air. The design of the Brown Blow Gun also includes a hook for hanging up purposes.

GRAY TURRET HEAD METAL CUTTER OR NIBBLER



GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Air-craft Parts, Aircraft Tub-ing, Sheet & Plate Shops.

GRAY MACHINE CO. Box 596, Philadelphia, Pa.

Sherman V-26 Greaseproof Wrapping Paper

A greaseproof wrapping paper for protecting highly finished metal parts against corrosion, to be known as V-26, has been announced by the Sherman Paper Products Corp., Newton Upper Falls, Mass. This paper was developed by Sherman packaging engineers working in conjunction with the armed services and war

industries.

Multiple wrapping operations are eliminated by combining two protective lam-inations in one paper. The inner ply provides a greaseproof barrier for the retention of corrosion preventives used on metal products, while a strong outer ply protects the greaseproof membrane against damage in transit. Both inner and outer laminations are noncorrosive, consisting of neutral kraft, colored red in accordance with government specifications for Grade A noncorrosive papers. Both are creped for greater flexibility in wrapping and have dead-limp folding qualities.

The Sherman V-26 Greaseproof Wrapping Paper is available either with an outer film of wax which provides a selfsealing surface or uncoated where the self-tack quality is not required.

THE PERFECTION WIRE STRIPPER WILL SPEED UP YOUR PRODUCTION IMMEDIATELY!

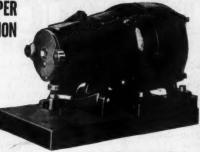
- RAPID
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- ECONOMICAL
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THE PERFECTION WIRE STRIP-

PER puts wire stripping on a production basis-Instantly and completely it removes the insulation from the ends of solid, strained or multi-conductor cable or wire, up to one half inch in diameter.

THE PERFECTION WIRE STRIPPER is a precision equipment—ruggedly built and engineered to provide years of trouble-free operation. Send now for descriptive

literature on this versatile and essential instrument.



PATENTED MODEL A

WEBER MACHINE CORPORATION

ROCHESTER, N. Y. RUTTER STREET

"ALL-WAY" LEVEL

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The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
51/2" x 12" 31/2" x 6"
Write for Bulletin

WM. B. FELL CO.

702 SOUTH ST. ROCKFORD, ILL.

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A TOOL CO.

Huguenet Park,

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TURN HEAVIER LOADS FASTER

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IDEAL
LIVE
CENTERS

Get more work, quicker, out of lathe, millers, grinders, etc., with
ETSCO Live Centers.
They rotate with the
work, and therefore
permit heavier loads—
faster speed — deeper
cuts. The radial load
is carried by a

high precision ball bearing, and thrust load absorbed by a taper roller bearing. All perts are harden ed and ground.



TRIPLE DUTY



Three interchangeable center pieces (illustrated above) for all kinds of centered and uncentered work. Saves set-up itme.

		COST	
Center No.		Cap.—100 r.p:m. Rad. and Thrust	Net Price
1-MA 2-MA	1 2	250 lbs. 250 lbs.	\$20.00 20.00
3-MA 3-MB	3	250 lbs. 400 lbs.	20.00 25.00 25.00
4-MB 4-MC 5-MC	4	400 lbs. 600 lbs. 600 lbs.	35.00 35.00
11/2—SC	Straight Straight	600 lbs. 600 lbs.	35.00 35.00
	PROMPI	DELIVERY	

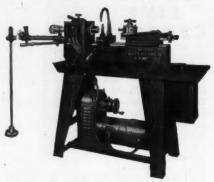
EASTERN TOOL SUPPLY COMPANY

"The House that Quality and Price Built"
176 Grand St. New York, N. Y.

943

Stevens Motor-Driven Screw Machine

A motor-driven screw machine which is available in two sizes, designated as the No. 1 and No. 2, having stepless



Stevens No. 1 Motor-Driven Screw Machine

spindle speeds from 600 to 2,400 and 375 to 1,500 r.p.m. respectively is announced by John B. Stevens Inc., 482 Canal St.,

New York, N. Y. The head of the machine is cast integral with the box-type bed, which is mounted in a steel pan having a large chip capacity and fitted with strainer and coolant reservoir. A motor-driven coolant pump is attached to the rear side of the machine head.

The Stevens Motor-Driven Screw Machine is designed so that the turret can be readily realigned under all conditions of wear. Independent stops are provided for each tool hole of the turret. Turret momentum is stopped by a solid plug, the vertical lock pin of the turret being used for indexing purposes only.

The cross slide of the machine is equipped with finely adjustable plug stops and is designed so that it can be readily lifted from the machine bed without removing the turret mechanism.

A magnetic braking arrangement is included in the electric drive circuit of the machine to enable repeated spindle reversings to be safely effected. All electrical controls of the unit are located within easy reach of the operator.

Specifications of the Stevens No. 1 Motor-Driven Screw Machine are as follows: bar capacity, % inch; maximum length that can be milled, 3 inches; bore of spindle, ‡ inch; swing over bed, 9

From Destroyers to Pipe Covering Rigs

The need for power transmission that will survive the extreme operating conditions of battle has developed clutches and power take-offs which provide unusually positive action and resistance to shock and vibration. Our research and engineering staffs have collected much valuable data and gained considerable experience in war products that will be of assistance to designers of peacetime products using

PULLMORE CLUTCHES

SEND FOR THESE POWER TRANSMISSION BULLETINS

Give capacities, dimensions and specifications. Contain application diagrams. Show exclusi e features that enable designing stand-out equipment. Ideas are not rationed. Your future may depend upon re-designing your product for postwar markets. Let our engineers make suggestions covering clutch applications.



Rockford Drilling Machine Division Borg-Warner
Corporation
300 Catherine Street, Rockford, Illinois, U. S. A.



Pullmore Multiple-Disc Clutches . Over-Center and Spring-Loaded Clutches . Power Take-Offs

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STANDARD SIZES SHOWN IN OUR GENERAL CATALOG

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THE GWILLIAM CO.

358 FURMAN ST. BROOKLYN, N. Y.

PROMPT DELIVERY—— PRECISION GROUND THREAD PLUG & RING GAUGES

American Nat'l Coarse Threads American Nat'l Fine Threads American Nat'l Special Threads In Accordance to A.G.D.

Single End—Double End Plugs
— Combination of a thread
plug and plain core plug for
minor diameters.
Salts Adjustable or Saltd

Split Adjustable or Solid Ring Gauges.

(Catalogues Not Available)

Sizes of plugs up to 10" dia.

Sizes of rings from %" to 8" 1.D.





ALLEN GAUGE & TOOL COMPANY

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FAST, ACCURATE
GEAR-CHUCKING
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SPEED-CHUCK



Simply place the gear in the chuck and give it a slight turn to the right . . . the gear is gripped firmly and is exactly centered by hardened pitch-line pins bearing on accurately ground eccentric cams. Suitable for hole and face grinding operations, also boring and turning, where precision and production are important. To release the gear, give it a slight turn to the left. Successfully used in prominent war production plants. Made to specifications for spur, helical, and step or cluster gears. Send print for quotation.

CHAS.

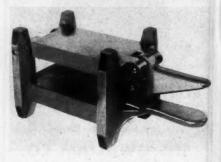
1712 HARLEM ROCKFORD ILLINOIS

inches; diameter of holes in turret, 1 inch; number of holes in turret, 6; largest diameter passing through turret, ½ inch; center of turret holes to turret slide, 1½ inches; collet used, Stevens No. 107; floor space required, 42 x 22 inches; shipping weight, 825 pounds.

Specifications of the No. 2 screw machine are as follows: bar capacity, 1% inches; maximum length that can be milled, 6 inches; bore of spindle, 1% inches; swing over bed, 10% inches; diameter of holes in turret, 1 inch; number of holes in turret, 6; largest diameter passing through turret, 18 inch; center of turret holes to turret slide, 1% inches; collet used, Stevens No. 140; floor space required, 60 x 26 inches; shipping weight, 1,150 pounds.

Parlec Universal Drill Jig

To help speed up tool production, Earl C. Parkhurst, 751 E. Stepney Place, Inglewood, Cal., has placed on the mar-



Parlec Universal Drill Jig

PADDOCK **Ball Bearing** BANDSAW GUIDES

Reduce Blade Breakage Increase Production

Easily adjusted to all sizes of blades to 11/2" wide.

Recommended for new and old machines running at any speed cutting all materials.

Shipped on 10 day approval

PADDOCK TOOL CO.

1418 WALNUT ST.

KANSAS CITY, MO.

ket a handy basic drill jig unit to be known as the Parlec Universal Drill Jig. The unit is sturdily constructed of cast nickel iron and normalized, with top, bottom, and both sides of jig frame and cover finished.

To use, the toolmaker or driller has only to machine the base of the jig for properly locating the part to be drilled, cut holes in the cover, and insert bushings. If the sides of the part are to be drilled, plates can be added to the sides of the jig. The part to be drilled is clamped firmly in position between the base and cover of the jig through a quick-locking device located on one end of the jig.

The Parlec Universal Drill Jig is avail-

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YNN TURRET TOOL POSTS

INCREASE OUTPUT - PROFITS

Designed to increase both the output and the variety of work possible on nearly all standard engine lathes. The bodies of these Turret Tool Posts are con-structed of solid steel—built for heavy duty production. All working parts are protected and provision made for their complete lubrication. Made in two styles and three sizes.

SAVE TIME - COST - LABOR

Because of their simple action and foolproof construction, these Tool Posts save time in indexing, which is done entirely with the top lock handle. They are indexed for eight positions, two for each tool, and one move-ment unlocks and indexes turret to next position; the opera-tor using only one hand. Locking handle insures positive rigidity.

LYNN MANUFACTURING CO., 219 Elroy Street, Minneapolis, Minn.

BUSHINGS









Get details on Acme Optical Flats and Monochromatic Lamp.



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ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts 212 N. Laflin St. Chicago, Ill. MONroe 4122

OOK AT THESE

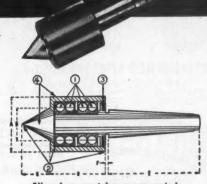
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FEATURES . . .

- 1. FOUR ROWS of precision BEC-4 specification bearings.
 2. SHORT OVERHANG assures rigidity and accuracy—eliminates "charter."
 3. Positive FELT-SEAL excludes dirt and retains lubrication.
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Mess Taper No.	A	В	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1%	36	%	111/16	2%	1600	\$23.00
3	1%	36	%.	111/is	3%s	. 3300	\$25.00
4	21/10	19/16	19/18	11%s	4%a	7500	\$35.00
5	2%a	1%	1	21/s	5%a	12000	\$47.00



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226 LAFAYETTE ST. **NEW YORK, N. Y.** able in seven standard cover sizes; namely, $1\frac{1}{2} \times 2$, $1\frac{1}{2} \times 6$, $3 \times 3\frac{1}{2}$, $3\frac{1}{2} \times 5\frac{3}{2}$, 3×11 , 6×6 , and 5×10 inches. Jigs with special sizes of covers and special heights can be furnished on order. A master layout is available which, when placed under a drawing of the part to be drilled, enables the part designer to readily specify the size of jig to be used for drilling the particular part.

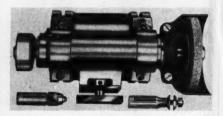
Themac Type J-4 Grinder

The accompanying illustration shows



149 Joseph Campau, Detroit

the Themac Type J-4 Grinder which is now being offered by The McGonegal Mfg. Co., East Rutherford, N. J. The grinder can be attached directly to the top of the compound rest of a lathe, an easy-to-get-at locking device firmly locking the clamping nut in T-slot. The circumferentially adjustable grinding spindle can be locked and operated in any position within the range of adjustment.



Themac Type J-4 Grinder

The Themac Type J-4 Grinder is designed so that it can be mounted on a bench lathe with the grinding spindle center to lathe center. By adjusting the compound rest or by swinging the grinder, any desired angle of grinding spindle center to lathe center can be obtained.

The circumferential and horizontal swing features of the Themac Type J-4 Grinder enable the operator to place the grinding wheel in front of the motor for external and internal grinding, or the grinding wheel can be swung to the rear of the motor for large diameter external grinding. By swinging the grinder around, the wheel can be operated on the left-hand side.

The motor and spindle housings are made of sand cast aluminum. All bearing seats are line reamed and lapped to assure proper fit and alignment. The



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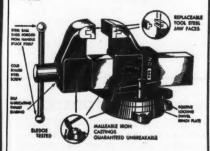
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THE MEN and WOMEN of the Columbian Vise & Mfg. Co. are proud of the Army-Navy "E" Award for outstanding production of war material.

We are happy to join the ranks with others whose work deserved similar recognition, and we accept the challenge of this recognition for our future efforts.

In turn, we express appreciation to our sources of supply and to our distributors who have helped us to serve other war industries and essential civilian customers during these war years.

The tools of industry are our weapons for the fight, and we will not lay down our weapons until victory is won.



THE COLUMBIAN VISE & MFG. CO.
9026 Bessemer Ave. Cleveland, Ohio

The World's Largest Makers of Vises



For Jigborers, Boring Mills, Milling Machines. It fits all popular indicators. The above illustration shown complete with extension bar.

No more tiresome tapping your indicator into position. Now — after locking to approximate position, you obtain final setting by simply turning Micro Adjusting Screw. This exclusive, time-saving feature of the OSLUND HOLDER for all popular indicators gives you complete control. Write today for details.



motor armature is fitted with a fan and a baffle plate inside the housing which directs a constant flow of air across the armature, thus eliminating the possibility of overheating. An automatic bearing adjustment allows for expansion and contraction. A wick oiling system provides sufficient oil for normal operation of the grinder. Plugs conveniently lo-cated above the wicks allow for easy refilling of wick oil reservoirs.

A set of five pulleys are supplied with the grinder for operating the spindle at the proper speeds for the various grinding wheels furnished. These pulleys are numbered, and a chart on the name plate attached to the grinder shows the correct combination of pulleys to be used with wheels of various diameters. Standard equipment of the Themac

Type J-4 Grinder includes four canvas belts; ¼-inch pencil wheel chuck with ¼-inch collet; two ¾, 1, and 1½-inch wheel collars; three-wire cord with snap switch; two-prong plug with ground wire (attached to motor); 4-inch wheel guard; No. 3 clamp nut (1% x 2% x % inch); can of oil; clamp head lock pin; inch); can of oil; clamp need lock pin; five pulleys; 2-inch extension spindle with nut; ¼ x ¼, % x ¾, and ¾ x ¾-inch pencil wheels with ¼-inch mandrel; 1½ x ½ x ½, 2 x ½ x ½, 2½ x ½, and 4 x ½ x ½-inch grinding wheels; 3 x 1½ x ½-inch tapered cup grinding wheel pered cup grinding wheel.

Perfection Wire Stripper

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BELT LACING

prevent waste-every hook can be used. Protects fin-Applied with a chine. 6 sizes.



Both types from

BELT HOOKS come with blue aligning cards that gers. Applied with a WIREGRIP or any other standard Belt Lacing Ma-



Perfection Wire Stripper

BELT LACING A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, pre-vents fraying. 2 - piece hinged rocker pins pro-vided. 8 sizes. In boxes, handy packages, cartons and long lengths.

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ARMSTRONG - BRAY & CO. "The Belt Lacing People"
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completely removing insulation from the ends of solid, stranded or multi-conduc-



STOP DUSTwith Model 1250 DUSTKOP

For CARBIDE TOOL GRINDERS ... SURFACE GRINDERS ... DISC GRINDERS...SANDERS...CUT-OFFS. Entirely self-contained DUSTKOP has 11/2 hp motor, multiple-blade fan, cyclone and filter, is portable, compact. See cutaway which shows how dust laden air is driven up from motor driven fan and sent through the high efficiency cyclone separator. Write for Bulletin A-100.

AGET-DETROIT CO.

Cutaway Model 1250

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WOMEN AT WAR

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. . SAVING MAN HOURS AND CRITICAL MATERIALS

No delay waiting for dies – parts ready quicker – deliveries speeded up – all to bring the Victory sooner! Women are rapidly taking a major place on the industrial front. DI-ACRO

Precision Machines—Shears, Brakes, Benders—are ideally suited for use by women in making duplicated parts accurate to .001"—DIE-LESS DUPLICATING. Thousands of DI-ACRO Machines are now in use in War plants. Get the whole story—write for catalog—"Metal Duplicating Without Dies".





New!

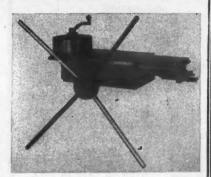
How to Convert Engine Lathes Into Screw Machines!

TURRET ATTACHMENT

Make your engine lathes do double duty by equipping them with Turret Attachments. Converts an engine lathe into a hand screw machine in 15 minutes—and vice versa—at a fraction of the cost of a new screw machine. Installed on the ways by simply removing tail-stock.

Fits Any Make Engine Lathe

A variety of models to fit any size and make of engine lathe. Six-station turret with automatic stops. Self-indexing to position. Adjustable screw stops. Write for full information—also 64-page catalog of standard cutting tools.



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Danly **Commercial Sets**

Danly **Special Sets**

THEIR PRECISION

Means Greater Accuracy In Your Production

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DANLY PRECISION SETS

SAFETY FIRST



in throwing belts on or off moving pulleys on the line

Prevents accidents. Two sizes.

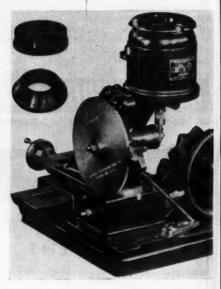
Write for Catalog 5-42.

THE READY TOOL CO. 510 IRANISTAN AVE. BRIDGEPORT, CONN.

tor cable or wire up to 1/2 inch in diamter, which has been placed on the market by the Weber Machine Corp., 59 Rutter St., Rochester, N. Y. The unit is said to be simple to use and is accurately and ruggedly constructed to provide long, trouble- free operation.

New Method Graduated Parts for War Industries

The greatly increased need for accurately calibrated rings, collars, discs, and so on, for ordnance such as machine gun mounts, sights, indexing handles,



New Method Precision Marking Machine for producing graduated parts for war industries

and so forth, is now being met in part by the special engraving and other equipment which has been installed in the plant of New Method Steel Stamps, Inc., 145 Jos. Campau, Detroit, Mich. Graduated parts of this type must be made with utmost accuracy; the angular graduations must not be affected by a variation of even a few thousandths in diameter.

The accompanying illustration shows a precision marking machine for ac-curately calibrating and marking collars and rings of the type shown in the

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reputation for utmost precision and durability.

Ask also for catalog KM on Files for Filing Machines; Burs catalog KR on Rotary Files and Diesinkers Burs

GROBET FILE CO. of AMERICA NEW YORK CITY

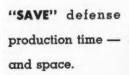
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Made in other sixes





All welded. Four sizes. Let us quote on your bench and bench leg requirements. Literature sent on request.

FACTORY EQUIPMENT CO

183 CHARLES ST. PROVIDENCE, R. I.

upper left-hand corner. The piece to be marked is mounted on the spindle of the machine, which is indexed by a master cam and latch mechanism according to the desired spacing of graduations. The graduations are then cut to specified length between each setting of the indexing spindle by a high speed cutter mounted on the vertical motor spindle.

Model "47" Skildrill

Designated as the Model "47" Skildrill, a small, lightweight, compact, portable



Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to % inch round or % inch square and band iron up to % by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts to same length on both wire or band iron. FREE TRIAL in your own shop. Write for further information and prices.

The Federal Foundry Supply Co.

4606 East 71th St. Cleveland, Ohio

electric drill which is especially designed for use in performing heavy duty drilling operations in the construction of aircraft is announced by Skilsaw, Inc.,



5037 Elston Ave., Chicago, Ill. The tool, which has a capacity for drilling holes up to ¼ inch in steel, is 7¼ inches long, 2Å inches wide, and weighs 3¼ pounds.

2½ inches wide, and weighs 3½ pounds. The Model "47" Skildrill features a die-cast body and is equipped with helical-cut gears and anti-friction bearings to assure smooth, quiet operation. Power for the unit is furnished by a Universal motor which is available in speeds of 1,800, 2,500, 3,500, and 5,000 r.p.m. The design of the tool also includes a two-pole momentary contact switch with lock for continuous operation.

Twistite Pressure Unit

A unique holding device which can be readily locked and unlocked through a single twist of the wrist, to be known as the Twistite Pressure Unit, is now being offered by the Michigan Clamp Co., Jackson, Mich. The unit consists of a smooth, unthreaded pressure bar

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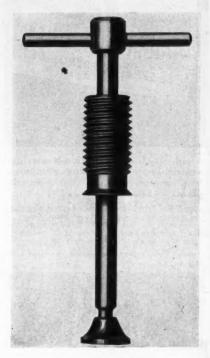
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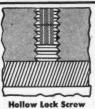
Operation of the Twistite Pressure Unit is simple and positive. In assembly work, the threaded pressure collar is fastened to a jig or fixture. In its unlocked position, the bar is free to slide axially into place against the part to be held. A twist to the right locks the bar integral with the collar. Thereafter, continued tightening develops the required pressure as the threaded collar takes up the load. To unlock, the opera-

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tion is reversed. The collar is provided with U. S. S. %-inch x 9 threads, thus enabling the pressure unit to be readily

adapted to practically any jig or fixture. The pressure bar and locking pin of the Twistite Pressure Unit are made of hardened steel, centerless ground to extremely close limits. When required, the pressure unit can be electrolytically treated to resist welding spatter. The unit is available in overall lengths from 3 through 12 inches and can be readily incorporated into the design of C-clamps and special holding devices.



NEW BOOKS

Industrial Radiology. Second edition. by Ancel St. John and Herbert R. Isenburger. Published by John Wiley & Sons, Inc., 440 4th Ave., New York, N. Y. 298 pages. 151 illustrations. Cloth binding, board covers. Price, \$4.00.

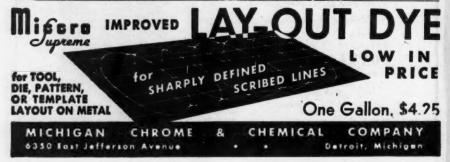
The purpose of this book is to present the practical aspects of industrial radiology in a form and language which can be understood by students, laymen, and engineers who desire to obtain some useful knowledge of the basic theories which are involved. No attempt has been made to produce a scientific treatise or a comprehensive work of all the theories. It is the hope of the authors that the book will help workers in this field to perform their investigations or inspection more easily, stimulate teaching and study of industrial radiology in technical schools, and serve to direct the attention of engineers and others to the potential value of this new technique in activities where hitherto its use has not been fully realized.

An urgent need for bringing this material up to date prompted the present revision. The change from the title of the original book, "Industrial Radiography," to "Industrial Radiology" indicates the fact that visual inspection of materials has now come of age. Radiology includes radiography and fluoroscopy.

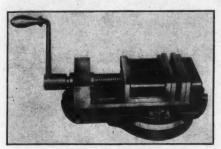
The book features a master index which makes all the applications and possibilities of industrial radiology available for reference without enlarging the text unduly. The index covers all subjects discussed in the text by page numbers and all the literature cited in the biblography by reference number

(in italic).

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and special applications.

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Industrial Fluoroscopy; XIV, Radiography of Large Castings and Forgings; XV, Radiography of Welded Vessels and Structures; XVI, Radiography of Small Objects; XVII, Some Interesting Examples; XVIII, Radiography with Gamma Rays; XIX, Radiography with Gamma Rays; XIX, Radiographic Specifications and Inspectors; XX, Operating and Cost Data; XXI, Looking Ahead; Appendix I, Radiographic Rules; II, Tables; III, Charts; IV, Bibliography; Index.

Miller's Popular Mathematics. By Denning Miller. Published by Coward-McCann, Inc., New York, N. Y. 616 pages, some 300 or 400 illustrations. Linen binding; board covers. Price, \$3.75.

The author of this book is not a professional mathematician; he is a business executive who simply majored in mathematics in college and who has found mathematics a superior, constructive tool in every stage of his career. The book could be described as a lecture on mathematics by a teacher who has a fine sense of humor. The result is a book on that dryest of all subjects—mathematics—written in a style which captures and holds the reader's interest.

Beginning with the simple addition of 5 and 3 to total 8, the author carries on through the simplest methods of arriving at the answers in arithmetic, geometry, algebra, analytic geometry, trigonometry, conic sections, solid geometry, spherical trigonometry, and calculus—but the chapters are not headed by those titles. The chapter on arithmetic is titled "Arithmetic without Long Division" and the rest of the chapters are titled as follows: Pick 'Em Up and Lay 'Em Down, Much Ado About Nothing, United We Stand, The Eternal Triangle, One Big Happy Family, The Music of the Spheres, and the Brightest



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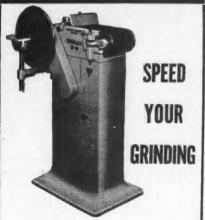
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our civilization is based, how trigonometry performs the magic of gunnery, navigation, surveying astronomy, and so on, how the properties of a circle and a sphere explain eclipses and other celestial wonders, and other applications of the science—and does it all without resort to purely academic language.

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X-Rays in Research and Industry. By H. Hirst. Published by the Chemical Publishing Co., Inc., 234 King St., Brook-lyn, N. Y. 129 pages. 82 illustrations, 13 tables. Cloth binding, board covers.

Price, \$2.50.
This book describes the types of problems in industry and in research, par-ticularly those problems coming within the field of physical metallurgy, for which the application of X-ray methods offers a solution. The book treats in detail the most suitable methods of approach to these problems as well as the actual practice and calculations of X-ray

technique.

Contents of the book range as follows: Chapter I, Production of X-Rays-(1) Cathode Rays, (2) The Generation of X-Rays; Chapter II, Properties of X-Radiation—(1) Continuous Radiation, (2) Characteristic Radiation, (3) Absorption of X-Rays; Chapter III, Structure of Crystals—(1) The Space-Lattice, (2) Crystal Symmetry, (3) Atomic Planes, (4) X-Ray Wavelengths, (5) Diffraction of X-Rays by the Crystal Lattice; Chapter IV, Methods of Crystallographic Examination—(1) Laue Method, (2) Rotating Crystal Method, (3) Debye-Scherrer or Powder Method, (4) Advanced Stages in the Analysis of Crystals; Chapter V, Applications of the X-Ray Methods-(1)

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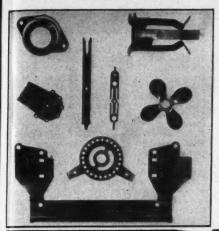
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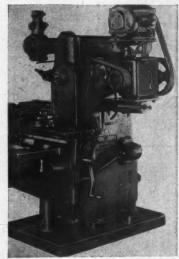
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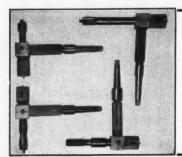


Investigation of Alloy Systems, (2) Effect of Atomic Distribution on the Properties of Alloys, (3) Identification of New Phases, (4) Measurement of Coefficient of Thermal Expansion, (5) Estimation of Grain Size, (6) Anisotropic Behaviour of Deformed Metals and Alloys; Chapter VI, Industrial Radiography—(1) X-Ray Equipment, (2) Principles of Radiographical Examination, (3) Examination of Castings, (4) Examination of Welds, (5) Determination of the Position of Flaws, (6) Application of Radiography to Manufacturing Problems

It is hoped that this book will fill a great need in providing in one small volume a thorough and self-contained study of the principles of X-ray technique and the versatility of its application. Although the number of references have purposely been kept to a minimum, those given should prove adequate to enable the reader to readily obtain a good grasp of the subject and to serve as a guide to a sudy of those advanced phases of X-ray technique that are not covered fully in the text.

The Machine Tool Primer. Published by The Herbert D. Hall Foundation, 1060 Broad St., Newark, N. J. 280 pages. Cloth binding, board covers. Price, \$1.50.

Illustrated throughout with more than 300 photographs and drawings, this volume is intended as an introductory text not only to machine tools but to the whole environment of machine tools as well. The volume is divided into two parts. Book I explains in simple language the use of machine tools. It presupposes that the student or general reader is not so much concerned at first with machine tools in themselves as with what they produce and with what other machinery they are associated in the metal-working industry. Therefore,



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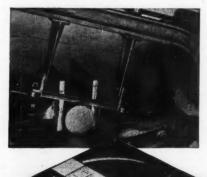


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Book II deals with primary machine tool functions and the various machines in which these functions are translated. There are seven chapters, all of which are illustrated with a number of simple line drawings and photographs. It is assumed that the beginner does not understand blueprint reading, hence, almost without exception, drawings reveal all three dimensions in a single view and are stripped of confusing detail in order to focus the attention on the particular function being illustrated.

Chapter headings of Book II are as follows: Drills and Drilling; The Metal-Working Lathe; Turret Lathes and Automatic Lathes; Planing and Shaping; Milling Machines; Grinding Machines; and Press Working of Metals. A technical vocabulary is built up as the reader proceeds through the book and no new words are presented without a proper explanation.

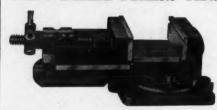
If Inflation Comes. Revised edition. By Roger W. Babson. Published by the Frederick A. Stokes Co., 443 4th Ave., New York, N. Y. 323 pages. Cloth binding, board covers. Price, \$1.35.

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With talk of the rising cost of living on every tongue, with the conflicting claims of statesmen and economists clamorous in the press, this book is timely, informative, helpful. In concise and simple terms, the author has prepared an explanation for the layman who is trying to understand the connection between today's headlines and his own pocketbook.

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In a chapter replete with charts and statistics, the author shows what happened in Europe under inflation and in what respects the situation parallels our own. An entirely new final chapter is devoted to collective protection through governmental agencies.

The eight chapter headings of the book are as follows: Pre-War Background; What Is Inflation;? Heading Off Inflation; How Inflation Affects Different Industries; Supposed Hedges Against Inflation; What Happened in Europe Under Inflation; What the Government Can Do to Curb Inflation; The

Only Safe Hedges.



Elementary Metallurgy. By W. T. Frier. Published by the McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. 207 pages, 5½ x 8 inches. 106 illustrations, 13 tables. Cloth binding, semi-flexible covers. Price, \$1.75.

This book is intended to fill the need for a short course on the characteristics of metals and the natural laws governing their behavior. No previous knowledge of metallurgy or chemistry is said to be required in order to understand the text. The aim has been to treat



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The winning of metals is discussed first, with a number of refining processes explained. Metal forming methods follow. The internal structure of metals and how the properties, strength, hardness, ductility, and so on, can be controlled are next considered, considerable space being devoted to constitution diagrams and an iron-iron carbide diagram. The various diagrams include a large amount of information on the effects of tempering temperatures on different steels.

The microstructure of metal is emphasized throughout with regard to the effect of rolling and forging, casting, heat treating, and so on. All theories of hardening and of the control of hardness of all metals, ferrous and nonferrous, have been summarized under one head; namely, strained, abnormal, atomic arrangement.

The 12 chapter headings of the book are as follows: Iron; Other Refining Processes; Cast and Wrought Iron; Methods of Forming Metals; Constitution Diagrams of Alloys; The Iron-Iron Carbide System; Heat-Treatment of Steel; Heat-Treatment of Steel; Heat-Treatment of Steel; Continued); Grain Structure of Metals; Alloy Steels; Nonferrous Alloys; Testing of Metals.

The Federal Wage and Hour Law. By Arthur W. Nevins. Published by the National Foremen's Institute, Deep River, Conn. 58 pages. Cloth binding, semi-flexible covers. Price, \$1.50.

A valuable aid for executives, department heads, and supervisors, this handbook contains up-to-the-minute rulings, together with questions and answers, pertaining to the Federal Wage and Hour or Fair Labor Standards Act of 1938. The book is written in an easy-





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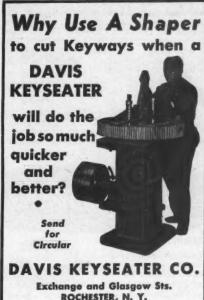
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to-understand manner by an attorney and specialist on labor law and is divided into nine chapters which are headed as follows: Covered Employees; Exemptions; The Employer-Employee Relationship; Minimum Wages; Working Time; Overtime; Records; Child Labor; Enforcement.

"Treatise on Planers." Published by The Cincinnati Planer Co., Forrer St., Cincinnati, Ohio, this cloth bound book is designed to pass on to the apprentice, the planer operator, and all those interested in metal planing the experience of thousands of Cincinnati Hypro Planer users. It briefly relates the history of the planer, gives useful information on planer design and construction, and discusses planer tools, setup, special jobs, typical work, and various types of planers.

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CP Hicycle Portable Electric Tools. The Chicago Pneumatic Tool Co., 8 E. 44th St., New York, N. Y., has published a 72-page catalog containing illustrated, descriptive, and tabular information on its complete line of Hicycle portable electric tools which includes various types of drills, reamers, screw drivers, nut runners, stud setters, tappers, grinders, sanders, buffers, and polishers. The catalog also features a section illustrating and describing different types of radial arms for use with the various portable electric tools as well as illustrated and descriptive data on frequency changers, motor generator sets, balancers, and so on. Copy of Catalog No. 900-2nd Edition free to mechanical executives upon request.

Atlas Bronze Bushing Catalog No. 35. Atlas Brass Foundry, Inc., 1901 Santa Fe Ave., Los Angeles, Cal., has published an 84-page catalog covering its line of fully finished ready-to-use standard bronze bushings and bearings; Elephant Brand completely machined cored and solid bronze bars and genuine phosphor bronze rod; oil grooving, drilling, and cutting off stock bearings; groov-



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U. S. Navy miscellaneous specifications for brass and bronze castings. Copy of Catalog No. 35 free to mechanical executives upon request.

"Blueprint for Faster, Better Production with Coated Abrasives" is the title of a 16-page three-color technical booklet published by the Behr-Manning Corp., Troy, N. Y., regarding its so-called sanding gadget (Spiracords, pencils, slotted discs, Spirapoints, and Spirabands) and their use in the manufacture of aircraft, ships, tanks, guns, engines, bombs, shells, bombsights, precision instruments, tools, dies, and so on. Copy free upon request.



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H. P. PREIS ENGRAVING MACHINE CO. 149A SUMMIT ST. NEWARE, NEW JERSEY "Gear Finishing." To answer many questions about gear finishing by the shaving process, the Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich., has prepared a 32-page bulletin designated as the No. GF-43. The bulletin, which bears the title of "Gear Finishing," is printed in three colors and is profusely illustrated with photographs and drawings.

Beginning by explaining applications of the crossed-axis method of gear finishing, such questions as the kinds and sizes of gears and the hardness of the materials that can be shaved, and how the process can be used to improve gear quietness and load carrying capacity are answered. The principle of operation of the process is next described, followed by data on relative gear accuracy and manufacturing cost.

The design requirements essential in obtaining accurate gears are then discussed, and diagrams are presented showing how computations to meet these requirements are made. Among these

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are such factors as avoiding interference between tooth tips and fillets, gear sizes and accuracies prior to shaving, and heat treatment.

"Curve-Shaving"—when to use it and when not—is discussed in detail in an endeavor to clarify the fundamentals involved. Following this is a discussion of the rack and rotary methods of gear shaving in which the sizes, kinds, and quantities of gears for which each method is best adapted are described.

This is followed by a brief description and specifications of each of the many types of Michigan gear finishing machines available, including the rack type, the light-duty rotary finisher for small gears, and the medium-duty and heavy-duty sizes of machines capable of handling gears up to 4 feet in diameter.

A page of the bulletin is also devoted to the relationship of gear shaving to preliminary gear cutting operations, such as hobbing and shaping. In addition, the applications of gear lapping and recommended methods of gear checking after shaving or lapping are presented. Copy of Bulletin No. GF-43 free to persons addressing a request on their company letterhead.

"Controlling Factory Production." Carefully planned production control in plants — small, medium, or large — has enabled manufacturers of war-time goods to double their output without undergoing serious disruptions despite machine and man power limitations. The means used to help accomplish such intensive controlled production, avoiding idle equipment and inefficient scheduling, provide the subject of a report issued by the Policyholders Service Bureau, Metropolitan Life Insurance Co.

1 Madison Ave., New York, New York. The report, which is entitled "Controlling Factory Production," is concerned with the time element in manufacturing and in related functions; namely, the question of when given quantities of goods are to be produced. This includes the problem of meeting promised delivery dates, maintaining a steady flow of work in the shop, properly utilizing the available equipment and man power, and avoiding congestion in the plant. All these objectives require strict adherence to standardized procedures which operate, to a large extent, through the medium of time-control forms and supplementary records. A variety of these forms and records, as well as suggestions as to their

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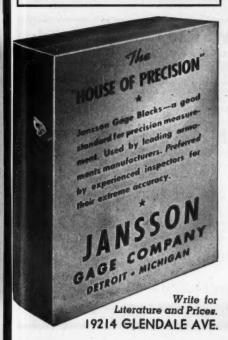
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practicability and use, are discussed in "Controlling Factory Production."

Much emphasis is placed on scheduling and progress control as fundamental considerations in production control. The report describes the scheduling of work both in jobbing shops and in factories having continuous-flow production, and cites methods by which the former type of company often capitalizes on the easier planning problem of the latter. Separate descriptions are given of the scheduling in small, medium-sized, and large shops. Machineload control, which is designed to mini-

mize bottlenecks, is described and illustrated, and typical expediting procedures are outlined.

Effective production control, the report states, depends on the existence of a number of operations or types of information which is not in itself a part of the control procedure. This information, which varies in importance with the size of the concern and the complexity of its operation, is tabulated to show its need in small, medium, and large companies—a check list useful to many executives in analyzing the basis for control system. "Controlling Factory Production" also outlines the functions of the foreman or the supervisor in executing planned production.

Copy of the report is available to executives who address a request on their

company letterhead.

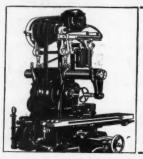


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blades, as well as other type machines, is now being issued by the Wells Mfg. Corp., 808 Tyler St., Three Rivers, Mich. Copy free upon request.

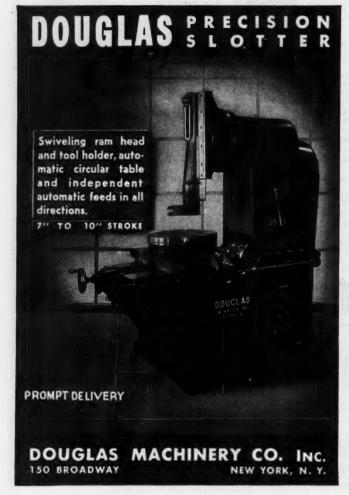
Motor Mica Reinforced Pressure Grease, a new grease compounded expressly for use with pressure systems, is the subject of a laboratory test report now being distributed by the Scientific Lubricants Co., Dept. G, 3462 N. Clark St., Chicago, Ill. Copy free. "Reconditioning Gas Welding & Flame Cutting Tips." After a period of normal use, gas welding and flame cutting tips acquire a deposit of carbon, slag, scale, and tarnish. Orifices become congested or clogged, a condition which usually prevents utilization of correct pressures. When operating efficiency is thus affected, gas is often wasted. Obviously, it pays to keep tips clean.

The usual method of cleaning tips is to employ drills to open and clean orifices so that oxygen have clear passages, then to buff and scrape surfaces

of tips to remove traces of carbon, s cale, and tarnish. In one plant where a large v olume of this type of work was performed, four persons working seven hours were required to clean 200 tips.

A time-saving method for maintaining brass or copper gas welding and flame cutting tips is described in a Special Service Report, "Reconditioning Gas Welding & Flame Cutting Tips," now being offered free of charge by Oak-ite Products, Inc., 57 Thames St., New York, N. Y. With this method. 500 tips are now said to be cleaned in three hours in the particular plant mentioned above, thus cutting in half the time previously required for cleaning tips. Also important is the fact that the new technique requires the time of only one individ-ual, thus releas-ing the other three for different work.

Below is the procedure follow-





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ed in using the new time-saving method for tip cleaning. Tips are first placed in a solution of Oakite Compound No. 32 to remove carbon, slag, and scale deposits. This is also followed by a cold water rinse. Tips are then given a 10 minute bright dip, which is followed by a cold water rinse, boiling rinse to dry down, and final air blow. The sequence of operations covers a period of approximately 90 minutes, after which tips are said to be completely free of deposits that upset flame balance. Possibility of mechanical injury to tips such as may occur when using wire cleaners or drills is avoided and tips are said to immerge from solution clean, bright, and looking like new inside and out.

Cannon Type AN Electrical Connector Bulletin. A revised 82-page bulletin on Cannon Type AN Electrical Connectors

is now being distributed by the Cannon Electric Development 'Co., Dept. AQ, 3209 Mumboldt St., Los Angeles, Calif. The bulletin is well illustrated and contains, in addition to general and tabular information on connectors, data on junction shells, AN cable clamps, dust caps, dummy or storage receptacles, and Cannon bonding rings. A Cannon Catalog Condensed Supplement is also included in a separate section of the bulletin.

The following types of AN connectorsare shown in the bulletin: AN-3100, wall mounting unit; AN-3102, box mounting unit; AN-3106, straight connector; AN-3108, angle 90deg. connector; AND10066, integral mounting; andspecial plugs adaptable to points of high vibration. A total of 167 insert





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as production by electric welding cuts cost, saves time and critical tool steel.

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arrangements with wire data are included. Copy free to mechanical executives upon request.

Ohio Revolving Tables. A 12-page bulletin illustrating and describing a line of round and square type revolving tables for horizontal boring, drilling, and milling machines and other machine tools is now being distributed by The Ohio Machine Tool Co., Kenton, Ohio. Copy of Bulletin No. 375 free upon request.

Scherr Limited Budget Inspection Laboratory. The George Scherr Co., Inc., 130 Lafayette St., New York, N. Y., is now issuing a four-page folder covering the Scherr Limited Budget Laboratory. Fourteen types of measuring instruments, tools, gages, and optical inspection devices are illustrated and briefly described in the folder, copy of which is available free upon request.

"A Specialized Service in Metal Products." This 20-page two-color booklet

includes a pictorial presentation of the products and services offered by the V. E. Sprouse Co., Columbus, Ohio. Products described include formed tubes, brackets, clips, clamps, cages, collapsible chutes, complete small machines, elbows, hand tools, hoods (portable), lifting equipment, metal boxes, radio chas-sis parts, precision stampings, spinnings, machining, dra wn or spun shells, condenser cases, small tanks (round or square), pressure chambers. gun parts, manifold supports, cable tube brackets, screen filter gages, tube shields, motor covers, mechanical parts for amplifying equipment, guards for belts, chains, gears, and so on.

The booklet also describes and illustrates the company's facilities for experimental design and model work, metal spinning, shearing and blanking, stamping, machine work, welding and brazing, contract manufacturing, and so



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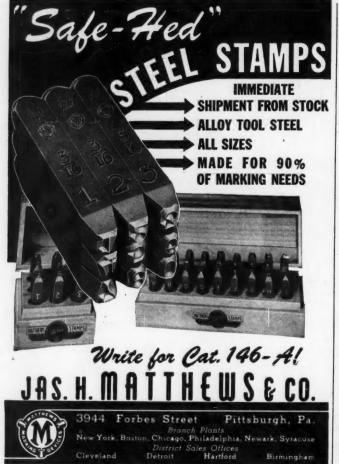
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the preliminary information on new materials and new methods that have been developed from war production experience and is now being compiled for ready reference by Hobart Brothers Company. Hobart is offering this unique service covering special information and new developments in metals to engineers, designers, metalworkers, and purchasing agents as another contribution to the progress of the welding industry

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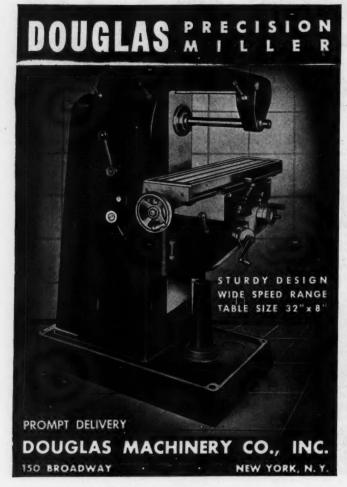
Wiedemann Turret Punch Presses with Gauge Tables. Wiedemann Machine Co., 1821 Sedgley Ave., Philadelphia, Pa., now has available a 12-page bulletin illustrating and describing Wiedemann Turret Punch Presses with gauge tables and their use in the shortrun piercing of sheets and plates up to ½ inch thick. Copy of Bulletin No. 92 free upon request.

"Wartime Conservation," a 96-page booklet published by the Westinghouse Electric & Mfg. Co.,

contains recom mendations by Westinghouse engineers for selecting, applying, and using electrical e q u i p ment so as to obtain the best possible output with the greatest saving in critical materials. The booklet covers up-rating of motors, thermal temperature loading of transform-ers, industrial network systems, line equipment and materials, and includes many helpful tips on saving and salvaging materials.

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Copy of Booklet B-3206 may be obtained from Dept. 7 - N - 20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.



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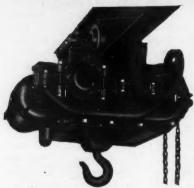
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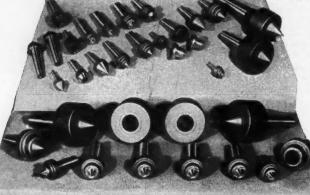
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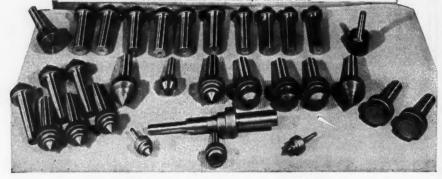
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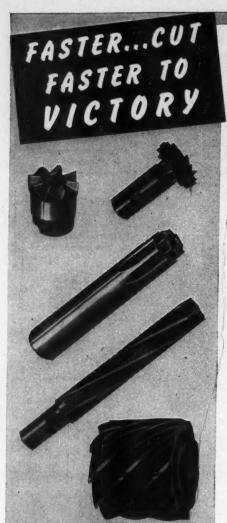
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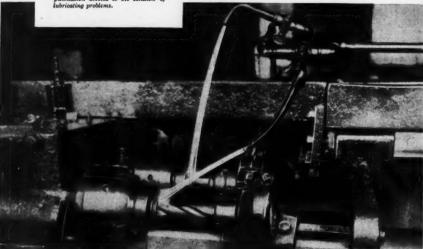
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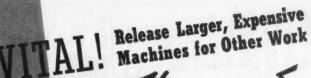




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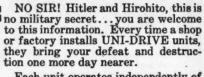
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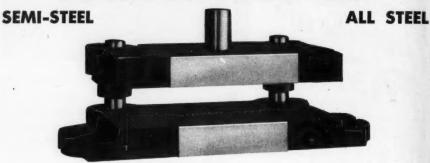
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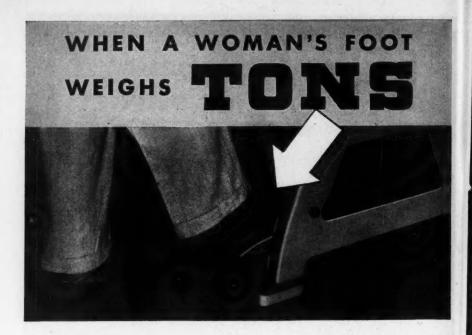
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PAGES 15

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The point is, you can't SEE the difference in carbide tools. The real difference can only be demonstrated on your machines! There you will see the increased production with TECO Carbide Tools, because of the exceptional cutting ability of the vital Carbide blank.

TECO Carbides are made to rigid standards of hardness, density and uniformity. They have greater resistance to wear and breakage . . hold cutting edges and accurate tolerances for longer runs — produce more pieces between grinds—save grinding and re-tooling time.

Make on-the-job comparisons with TECO Carbide Tools and see the difference! Available promptly in grades, styles and sizes for practically all machining needs.

Write for your copy!

NEW
TECO
CATALOG

Gives specifications of all standard TECO Cerbide Tools and Blanks for turning, boring, facing and cut-off operations.

TUNGSTEN ELECTRIC CORPORATION • 562 39th St., Union City, N. J.

Bronch Office: 2906 Euclid Avenue, Cleveland, Obio

Representative: Architects and Builders Bidg., Indianapolis, Ind.





pendable instrument for checking angular surfaces is the Robbins Sine-Plate. Standard gage blocks are used to set the plate to the required angle. This makes the set-up extremely

The Robbins Sine-Plate is made with the same accuracy and fine workmanship that have made the Robbins Magna Sine Magnetic Chuck known through-

out the world. Since many of the same standard parts are used in both of these precision tools any necessary replacement can be made quickly and at low cost.

The Robbins Sine-Plate is available in two sizes in both single and compound angle models. Increased production has made the delivery situation exceptionally good. Write today for full details.

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Established 1860

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Executive Offices and Factory * 938 East 41st Street * Chicago, Illinois

Sole Producers of-DTCo * LOC-KEY-SET * RE-SET-ABLE * BIG-HED-DIAMOND TOOLS

MOUNTED DIAMOND DRESSERS IN STOCK-READY FOR SHIPMENT

"C" Teels contain Common Quelity Diamonds. Price \$12.00 per carat. (Weight stamped on teels)
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"S" Teels cantain 5 e i e.c.t Quelity Diamonds. Price \$48.00 per carat. (Weight stamped on teels)



RESETABLE LOC-KEY-SET RE-Setting \$1.00 each tool. Mailing envelopes free to Victory Plants, Grinders' instruction card free.

INSTRUCTIONS FOR ORDERING: Number of each tool pic-tured is eight times the diamond size contained in tool, and is two times the diameter of gridning wheel each tool is suited for. Example—For ½ carest number of tool is 4, and it is suitable for 2 carest number is 24, suitable for 12-inch wheel, for 3 carest number is 24, suitable for 12-inch wheel. NOTE: Above recommended sizes are for

heavy production and include an added 50% safety allowance. For light work add 3 dismerer to recommended wheel size. Dismond weights are stamped on all tools where space parmits. Form Tool Dismonds: Special tools made from customers' prints and specifications.

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GILBARCO COOLANT PUMPS dependable... durable

- One of a complete line of pumps for all machining operations.
- Built for twenty-four hours a day service.
- Instantaneous coolant delivery, self-priming, never becomes airbound.
- Does not build up pressure at slow speeds.
- Positive mechanical seal, ball bearings throughout—unharmed by running dry.
- Built by one of the country's largest pump manufacturers.

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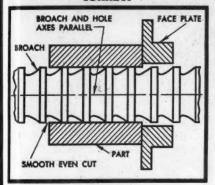
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May, 1

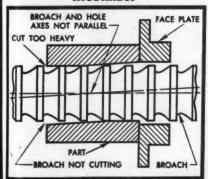
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Be Sure PART HAS BEEN PREPARED CORRECTLY

CORRECT



INCORRECT



When broaching round holes it is very important that the axis of the broach be in perfect alignment with the axis of the hole being broached. This insures an even cut all around the circumference and an even stress on the broach.

The most important requirement in securing this condition is to have the hole square with the locating face. If the hole is not square strains will be set up which may cause breakage of the tool, or force it to cut too heavily on one side, and too lightly on the other, resulting in a hole not completely "cleaned up".

In those cases where squareness of the hole is not possible self-aligning face plate should be used. This will be described in a subsequent advertisement.

COMPLETE BROACH SERVICE





MODERN MACHINE SHOP

May, 1943





- use hundreds of different accessories.
- have 4 types of readily interchangeable handpleces.
- e are portable, yet sturdy; easy to handle, yet rugged.
- get into tight corners and irregularly-shaped parts.
- a are adaptable to hundreds of regular and emergency uses.

No matter what kind of equipment you have

— no matter what type of work you do —
FOREDOMS CAN BOOST YOUR PRODUCTION!

There's a reason why Ford, Bendix, Westinghouse, Allis-Chalmers, Curtiss Wright and many other war plants are equipped with Foredom Flexible Shaft Machines! Foredoms eliminate many types of old-fashioned, time-consuming hand work and thus speed up produc-

tion. Foredoms are just as ready to "pinch hit" in emergency breakdowns. Models from \$17.50 to \$48.75.

Send for Catalog No. 405 and find out how a Foredom can help solve today's production problems in your plant.









FOREDOM ELECTRIC CO. 27 Park Place, New York. Please send us your new catalog No. 405, showing the different uses of Foredom Flexible Shaft Machines.

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Many nationally known defense plants have stated that they did not have to return, as defective, any of the special cutting tools they ordered from us.

They further commented that they suffered few interruptions in their operators' work and obtained a long useful life from our special cutting tools, because of their accuracy and fine workmanship. Let us quote on your next cutting tools, especially round work.

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SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS



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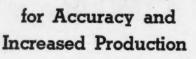
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NEW YORK, N.Y.

ERICKSON Precision COLLET CHUCKS



ONE ERICKSON COLLET
WILL REPLACE AT LEAST
7 STANDARD SINGLE
PURPOSE COLLETS



Vertical Milling Operation with Model 101 Chuck



MODEL O1



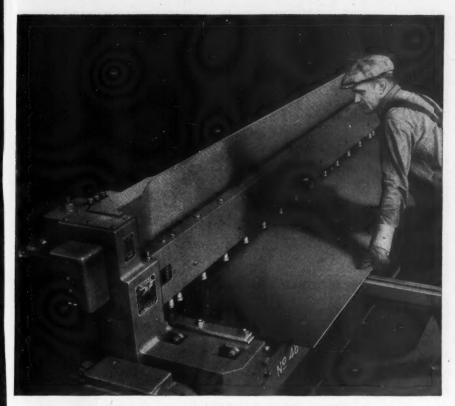
Tool Post Grinder equipped with Model 301 Chuck.



Model 201 used in Drill Press. Extra long drills can be used by extending them from the Chuck as they wear.

Send for Copy of Bulletin "D"

ERICKSON STEEL CO.
2309 HAMILTON AVENUE CLEVELAND, OHIO



War plants throughout America are obtaining more production per man hour wherever sheet metal must be squared, trimmed or cut into strips. The above photograph gives an "operator's eyeview" of one of the latest type Niagara Power Squaring Shears. The entire machine is arranged for convenient operation, quick, accurate setting of ball bearing, self-measuring, parallel back gauge, full visibility of cutting line and many other features which



speed up shearing. Niagara Power Squaring Machines are built in a complete range of sizes and capacities.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

NIAGARA MACHINE & TOOL WORKS

District Offices: Detroit, Cleveland, New York

Faster, More Accurate Tapping With

New "TRU-GRI TAP HOLDER

Equipped with MORSE TAPER SHANK

 Production line tests show definitely that speedier, more accurate tapping with less tap breakage, results when this new Tru-Grip Tap Holder is used. It is equipped with Morse Taper Shank for more efficient tapping on machines with reversible spindles and multispindle drill presses. Shank and body are hardened and ground for maximum accuracy. Special design makes this the lightest tap holder on the market—onethird the weight of conventional tap holders.

Offers Many Exclusive Features

A broached section in the chuck receives the flattened surfaces on the spring collet, while the tap has a positive drive through the square hole broached in the collet. The tap is held in true alignment by the round of its shank, and tap shanks are never scored or disfigured. Other features include: Wide range of tap capacity: one-piece body and shank; accepts standard size taps.

SEND FOR BULLETIN

giving full details, prices, specifications of "Tru-Grip" Tap Holders: Collets, as well as Procunier Tapping Heads and Procunier Tapping Machines.

PROCUNIER

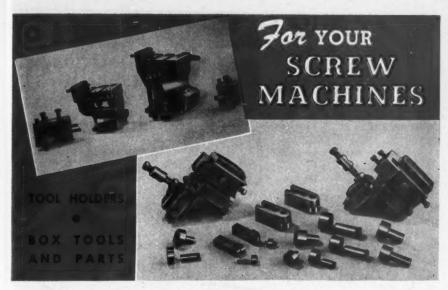
SAFETY CHUCK COMPANY

12 S. Clinton St.

Chicago, III.

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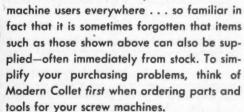




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Modern Collet is one dependable source for all types of replacement parts and tools for screw machines.

Many Modern Products are entirely familiar to screw



This up-to-date catalog lists information and prices on Modern Products. Be sure you have a copy at hand.



401 Salliotte Street

Ecorse, Michigan

The Inspection Usefulness of at Least



Pictured above are some of the types of gages manufactured by Lincoln Park and in which Carboloy cemented-carbides are used. To get the equivalent in wear-resistance and useful, accurate life in steel gages, at least fifty times the number of gages illustrated would be required.

The lasting accuracy of a Lincoln Park Carboloy gage is obvious because of its wear-resistant qualities. What is more important is that when the gage is ordered it can be specified extremely close to required limits—a guarantee of the greatest accuracy and economy in the inspection of hundreds of thousands of parts with one single gage. This is made possible since wear allowance can be reduced . . . automatically increasing the manufacturing tolerance.

Carboloy gages in War Production have helped to save steel... release gage manufacturing capacity... and provide the original and lasting accuracy that has eliminated rejections of important and expensive parts which should be acceptable in final inspection. Most of these gages have been produced by the Lincoln Park organization... pioneers in its use and over a number of years the largest users of Carboloy in the manufacture of gages... an outfit to depend on for the finest wear-resistant gages of the future.



May,

LONG LENGTH

HIGH SPEED DRILLS

9" Cutting Flute

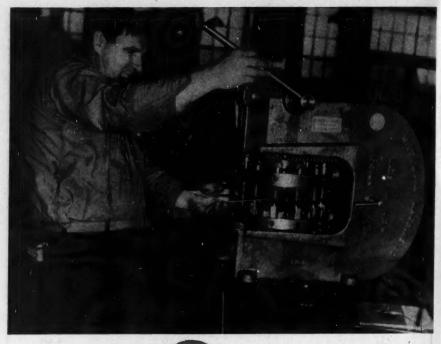
12" Long



Size Inches	Length Overall Inches	Length of Flute	Our Price Net Each High Speed
3/16	12"	9"	3.00
13/64	12	9	3.25
7/32	12	9	3.25
15/64	12	9	3.25
1/4	12	9	3.50
17/64	12	9	3.50
9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
3/8	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
29/64	12	9	4.75
15/32	12	9	4.75
31/64	12	9	5.00
1/2	12	9	5.00
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VICTOR MACHINERY EXCHANGE, INC.

251 CENTER STREET Phone: CAnal 6-5575 NEW YORK, N. Y.





1. Make a special washer in 60 seconds?

 Punch 2 or 3 different sized holes in ¼" or ¼" mild steel in a minute?

3. Punch 2 or 3 sizes of blanks out of shim stock in 60 seconds?

4. Make a special gasket having 3 or 4 holes of various diameters in approximately one minute?

5. When the engineering department calls for a rush job to put 2 or 3 holes in a radio or similar chassis, can you punch them in 60 seconds?

If you can't — then you'll be interested in the Wiedemann R-2 Turret Punch Press, which puts twelve different diameter punches and dies at your fingertips in one conveniently located hand operated turret punch. Punches and dies are quickly replaceable with

other sizes or shapes. Save literally hours in short run, accurate punching work.

The R-2 is ideal for tool room, machine shop, aircraft factory, experimental department, sheet metal shop...



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TWO TYPES OF R-2

2 punches and dies up to 1 diameter
2 punches and dies over
10 1½" diameter. Price
elivery: Approx. 6 weeks with
adequate priority.
Priladatana

11-STATION

11 punches and dies up to 21/4" diameter (sixes to meet your needs).

Price \$550

WIEDEMANN TURRET PUNCH PRESSES & CAUGE

May,

Tungsten Carbide Tipped Tools

Price \$1.00 Each In Any Size

New Low Prices—Increase Production—Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining castiron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left-100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	1/4 x 1/4 x 2
R-101	L-102	16 x 16 x 21/4
R-103	L-104	% x % x 21/2
R-105	L-106	18 X 18 X 3
R-107	L-108	1/2 x 1/2 x 31/2



Bel	ow-
300	Series

Tool No.	Shank Size	
300	1/4 x 1/4 x 2	
301	16 x 16 x 21/2	
302	% x % x 21/2	
303	1/2 x 1/2 x 31/2	

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

SERIES 100

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.



Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

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GEARS THREADS

CAMS SPLINES

Excellent facilities for grinding gears, cams, threads and splines on a contract basis.

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Hartford, Conn.

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Straight, Cylindrical, Shoulder, Profile, and Multiple Diameters . . Ground Taper Pins Screw Machine Products. Heat treated and ground if necessary. Improved and expanded facilities insure prompt and accurate service.

Send blueprints or samples for estimates.
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EXTERNAL CYLINDRICAL GRINDING **BLANCHARD SURFACE**

GRINDING **PLAIN SURFACE GRINDING** THREAD GRINDING

Send Blueprint Sketch or Samples for Quotation



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Hand Screw Machine Products

UP TO 3" BAR OR CHUCK.
PRODUCTION MILLING ON DUPLICATE
MACHINE PARTS. GAUGES, JIGS, FIXTURES AND SPECIAL MACHINES.

BEAVER MACHINE & TOOL CO.

1137 W. Belden Ave.

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y, 1943

Syracuse, N. Y.

Sturtevant Torque Wrenches. A bulletin containing illustrated, descriptive, and tabular information, including prices, regarding its complete line of torque wrenches is now being distributed by the P. A. Sturtevant Co., Addison, Ill. Copy free upon request.

"They Used Their Heads" is the title of a 20-page catalog released by Van Dorn Electric Tool Co., 720 Joppa Rd., Towson, Md., describing and illustrating how production experts have adapted Van Dorn and Black & Decker Portable Electric Tools (drills, nut runners, hammers, buffers, and so on) to emergency war uses. Copy free upon request.

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ALL SIZE BLANKS IN STOCK. Teeth Cut To Your Specifications. Prompt Delivery. Write for quotation.

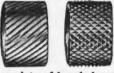
GREAVES MACHINE TOOL COMPANY

2009 Eastern Avenue

Cincinnati, Ohio

Veelos V-Belt. An eight-page catalog containing complete information on Veelos Adjustable Link V-Belting is now being distributed by Manheim Mfg. & Belting Co., Manheim, Pa. The catalog shows in detail a sequence of operations for taking a Veelos V-Belt apart with an ordinary screw driver and the necessary steps followed in coupling the belt together again without the use of any tools whatever. The catalog also illustrates and describes a procedure to be followed in installing a Veelos V-Belt. In addition, the catalog contains complete engineering data and a sample calculation for determining the necessary size of a drive, as well as several illustrations showing typical applications of Veelos V-Belting. Copy free upon request.





Produces wide variety of knurled patterns, using only straight-cut knurls.

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because they save hours of time, prevent costly breakage and long shut downs.

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Write for Catalog Sheets. ARMSTRONG-BRAY & CO.

"The Belt Lacing People"

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"Speed Up Your Welding Jobs" is the title of a four-page illustrated bulletin published by the Pier Equipment Mfg. Co., Benton Harbor, Mich., regarding its Peer P-50 and P-100 air-operated press-type combination projection and spot welders. Detailed information on

the construction and application of these welders is presented together with a chart of welding capacities for different gauges of sheet metal and structural steel wire, rods, and nonferrous metals. Copy of Bulletin P-50C free upon request.

May, 1



Morse Tool Company DETROIT . MICHIGAN

milling cutters over the past 22 years. With the experience, ability and facilities available today, it is one concern you can certainly depend on to complete to the last detail the "check-off" of your list of requirements.

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The Last Word . . .

THERE is an old saying to the effect that nothing is ever so bad but that some good can result from it. This is true, even of war. And the good that engages the attention of the editor at the moment is the increasing speed with which the South is developing industrially. In the early history of the American colonies the Northern colonies were settled much faster than those in the South and by colonists who were more industrial-minded. The natural result was that most of the factories and industries were located in the North while the South was devoted to the growing of cotton, tobacco, and other similar crops. The South prospered, but the wealth of the planters largely depended upon assets which vanished with the close of the War between the States. Since that time the distribution of wealth in these United States has been unequal; the South has been handicapped because of its lack of industries; incomes in the South have been small compared with those in the North, and the South has had a continuous uphill struggle on its hands.

In more recent years industries have been established here and there throughout the South, one at a time. To save needless and costly transportation of cotton from the South to the cotton mills in New England these mills were dismantled and new mills were erected in the South. More recently firms building products in which a great deal of wood was used have established branch plants in the South. Until recently Southern pine was unusuable for news print but within the past few years a new method of processing Southern pine has been developed which makes it possible to use that wood for news print and thus another new industry has been created for the South. But it remained for the present war to really put the South over the top industrially. Vast war plants of all kinds have been built in various parts of the South and there is no question but that many of these plants will continue in operation when the present war is over.

It will be one of the finest things that could happen to the United States when the South has its share of American industries. And there are good reasons why it should have. The South has 1/3 of the minerals of the United States, 1/5 of the bituminous coal, 2/3 of the oil, 97 per cent of the phosphates, 99 per cent of the sulphur, over 90 per cent of the cotton, 100 per cent of the turpentine and resin, vast deposits of iron ore, and vast deposits of salt. In Alabama the proximity of iron and coal deposits has contributed to the development of huge iron and steel industries. On the seaboard the temperate climate has fostered the development of shipbuilding industries. And where such industries thrive and grow there also will other industries thrive and grow to meet the need for tools, machinery, and so on. Just before the present war started the Southern states had some 23 industries each having an output in excess of \$100,000,000. Under the present circumstances both the number of industries and gross output of those industries must have multiplied and these increases in the number of industries and in the gross business must necessarily be reflected in increased payrolls and consequent raising of the standard of living throughout the greas affected.

More power to the South, for a more prosperous South will mean a more prosperous nation.

Howard Campbus



May, 1943

MODERN MACHINE SHOP

CINCINNATI

QUICK-CHANGE GEARED-HEAD MOTOR-DRIVEN

LATHES

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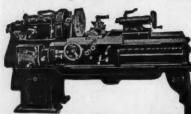
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Guaranteed for Workmanship, Materials and Performance

They need no introduction to experienced machine shop men. Their many exclusive features enable the operator to reduce operating expenses and more than earn their cost in a short time. Our close co-operation with many of the leading plants everywhere has helped solve perplexing lathe problems for boring, turning or chasing any metal work always most economically.



Latest catalog contains detailed specifications on 14", 16", 18", 20", 22", 24", 27" and 30" sizes. With them are obtainable 32 to 96 changes of thread and feed; 12 to 24 spindle speeds by simply lifting the lever to cover every shop requirement. Whether in tool room or manufacturing plants, CINCINNATI LATHES give most remarkable performance.

Designed and produced by specialists since 1906.

THE CINCINNATI LATHE & TOOL CO. MARBURG AVENUE, ONLO



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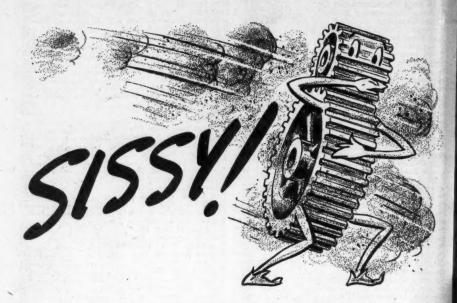
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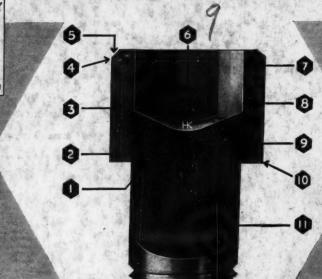
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